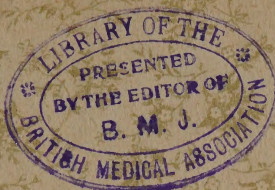


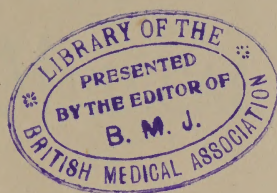


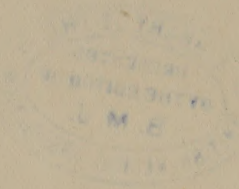


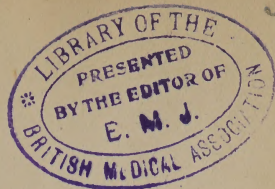
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A YEARLY REPORT OF THE PROGRESS OF THE GENERAL SANITARY
SCIENCES THROUGHOUT THE WORLD.

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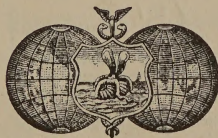
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VOLUME I.



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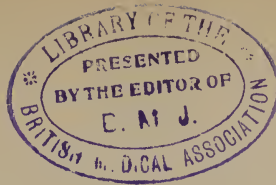
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PREFACE.

IN the elaboration of the 1896 ANNUAL the aim of the editor has been to add to the practical value possessed by former issues, —*e.g.*, to afford greater aid to the general practitioner and to enable investigators and authors to find in its pages not only food for thought, but also a greater number of utilizable facts.

If the new features introduced have any merit, the editor wishes to state that the manner in which the profession at large and the medical press have acknowledged his efforts from the start are alone to be thanked. Kindness has been a power in this instance; it has helped the editor to surmount difficulties untold and to face with comparative equanimity what to the majority of men would have proven too trying to be endured.

To bring the usefulness of the ANNUAL to its highest standard it was deemed advisable to increase the length of the abstracts, so as to make it possible to fully convey an author's meaning and to furnish the reader with sufficient data to enable him to utilize that author's suggestion to the best advantage. That logical sequence plays an important part when knowledge is to be inculcated cannot be denied; interruption of a fixed line of thought distorts the mental impression received, compromises the sense, and leaves but a vague notion where a correct interpretation might have been the key-note of valuable information. A re-arrangement of the entire text was deemed necessary to fully carry out this idea. To request the members of the associate staff to strictly carry out the proposed changes was not considered justifiable. Delicacy hardly warranted such a request, while past experience had shown that the greatest effort was necessary on the part of many associates to prepare even the articles in their simpler form within the proper time. The editor, therefore, thought it advisable to increase the number of his immediate assistants, and with their help to prepare the majority of the articles in the new form, introducing not only the best work done during the year, but also all features which might prove of interest to the associate editor in charge of each

department. Each associate enjoying the privilege of erasing, changing, or adding anything he chose, his rôle became concentrated to the most important features,—selection of valuable and presentable material and insertion of personal comments. The logical sequence and general arrangement of the several articles not being to a material degree disturbed, the editor's ideas were thus fully carried out, while the prerogatives of the associates were fully respected. That all but two of the departments (Surgical Diseases and Surgery of the Rectum and Anus) were very carefully gone over by their respective associates the editor can affirm. The two exceptions are only mentioned to relieve the editors of all responsibility should any error have inadvertently been published. As will be seen, the great majority of the associates have contributed valuable personal commentations. These are distinguishable by individual initials, while the commentations bearing no initials were introduced by the editor,—deductions furnished by a general view of the year's work as a whole.

While over half a million words added to the ANNUAL greatly enhance the value of each subject treated, the increase will naturally impose greater labor upon the physician who wishes to acquaint himself with the progress of the medical sciences as a whole. This class of readers, in the opinion of the editor, is entitled to the greatest encouragement. The professional reader who seeks to familiarize himself with every branch of medicine can alone be considered as well informed nowadays. The epoch of absolute specialism belongs to the past; every disease known represents but one link of a chain, and to totally ignore portions of that chain is to refuse the light its other links may afford and to limit one's capabilities. In practical medicine this is not permissible. This being conceded, the fact must also be recognized that the life of the average practitioner is such an arduous one that it is oftentimes only by a sacrifice of rest that he can peruse his journals and the other sources of information at his command. Between duty and possibility here there is a gap,—one, indeed, worthy of profound interest. The hard-worked practitioner is the protector of a correspondingly great number of human lives; to help him, therefore, in acquiring practical knowledge is to increase his fighting force,—*e.g.*, to help him in the accomplishment of his noble duty—a higher one than any

allotted to man. It is especially to these overburdened members of our profession that the Analytical Index and Cyclopædia of Treatment is respectfully dedicated.

In the vast field before us we can, at best, but gather the salient points of what we read. The memory seizes upon the theme of a given subject, and time either allows the impression to disappear or, by furnishing evidence of its worth, brands it as an acquisition to our knowledge. To present these salient points in a form at once intelligible and practically useful has been the aim of the editor in elaborating what he considers the most important feature of the 1896 ANNUAL. The Analytical Index and Cyclopædia of Treatment gives a summary of every practical article quoted in the ANNUAL proper, and of all the criticisms introduced by the associate editors,—the active principle, as it were, of the whole year's labors. The arrangement of this material is peculiar,—a counterpart, as it were, of an international medical congress in brief,—each subject being subdivided into sections. The excerpts being arranged in careful, logical sequence, each phase of a disease is taken up in turn and each author expresses his views at the proper time. The brevity of the excerpts gives them a most striking character, and the whole, with its numerous contradictions, the overwhelming evidence adduced in favor of certain views or against others, etc., constitutes what seems to the editor to be a most instructive combination,—one, indeed, he thinks, never before placed before the profession. The literature of a given year does not always cover every subject. When necessary, a brief outline of the treatment of each disease thus overlooked has been introduced. Fortunately the year 1896 was unusually prolific, and the insertions needed were few. During the preparation of the work any very important innovation in the general field of medicine, appearing in the medical press, was noted and introduced as an editorial note, thus practically bringing the most important questions up to the date of publication. A smaller type for all insertions had first been decided upon; but, the eyes of the older readers of the ANNUAL being borne in mind, it was finally decided to use but one type throughout the entire Analytical Index.

Taking the Analytical Index and Cyclopædia of Treatment as a whole, the fact that it occupies but about 350 pages makes it

possible for an average reader to review the entire field of medicine and surgery, including the specialties, in a few evenings. If he should desire to obtain greater information upon any given subject, a reference number at the end of each excerpt enables him easily to ascertain the precise location of the article in the body of the work. To writers and teachers the increase in the text and the Analytical Index can but prove of great value. In the first series of the ANNUAL (1888) it was stated that the purpose of the work was "to enable investigators to better compare." Correlated in close array, as is the work of the year in the Analytical Index, the excerpts will enable the reader to arrive at his own conclusions as to the value of all new suggestions and to judge, from the support accorded older ones, which of them merit his confidence. It is in connection with this feature that the many commentations of the associate editors will prove invaluable.

Among the smaller items of improvement the following may be enumerated: 1. Headings and side-headings are presented in large, black letters, instead of the small capitals and italics formerly used. 2. All prescriptions are written out in full and in the usual form instead of running them into the text as heretofore. 3. All therapeutic subjects have been collected in the fifth volume, so as to enable the practitioner to keep it upon his desk for ready reference. 4. Increase in number of colored plates, the superiority of which is very evident.

To the members of the Associate Staff the editor wishes to express a degree of appreciation proportionate with services rendered. The revision of the articles and the insertion of personal commentations required considerable personal labor in many cases; that this has added much to the value of the work needs hardly to be emphasized. The commentations of Prof. O'Dwyer on Intubation, Dr. Dudley Buxton on Anæsthetics, and Prof. Obersteiner, of Vienna, on Diseases of the Spinal Cord, for instance, are acquisitions to science; the same may be said of those of Prof. J. William White, of Philadelphia, and Prof. J. McFadden Gaston, of Atlanta, etc.

To his immediate assistants the editor cannot sufficiently express his gratitude. Upon them fell much of the most arduous labor, and if it had not been for the support received from Mr. and Mrs. Devereux, especially, the work could not have been prepared

in proper time. Dr. Arthur Turner's services are also entitled to the editor's special recognition. Dr. Robert Turner, Dr. C. S. Witherstine, and several other personal friends have placed the editor under many obligations.

Mr. H. B. Van Horn, manager of the printing-department, and Mr. T. S. Coom, proof-reader, have had unusual labor imposed upon them. The patience and the kindness shown by both, under difficult circumstances, have been exemplary, and in thanking them the editor hardly gives expression to his feelings.

The Burk & McFetridge Company have contributed colored plates which speak for themselves. The beauty of several compares favorably with the best work done in Europe,—a fact which should not be forgotten by American institutions of learning. In this connection The F. A. Davis Company merit the thanks of the profession. Notwithstanding the great increase in the cost of production, the extra matter presented, the Analytical Index, etc., the selling price of the work is not increased, and the editor sincerely hopes that a liberal patronage will be their reward.

THE EDITOR.

PARIS, July 1, 1896.

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DISEASES OF THE BLOOD AND SPLEEN, Section K

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DISEASES OF THE LUNGS AND PLEURA.

BY THE CENTRAL EDITORIAL STAFF.

SUBMITTED FOR COMMENTATION TO

JAMES C. WILSON, A.M., M.D.,

ASSOCIATE EDITOR,

PHILADELPHIA.

General Considerations.

[EXPERIMENTAL evidence has shown that animals cannot exist in absolutely pure air. Whether benign or malignant, atmospheric micro-organisms are now thought to yield a biochemical force necessary for the maintenance of our existence. Man is therefore seemingly destined not only to be surrounded by germs, but also to absorb them as life-giving principles and as death-dealing foes, the continuation of his life depending upon his power to antagonize their virulence. Under these conditions adequate powers of resistance mean health; fight consequent upon an intrusion of the foe within certain precincts means disease; victory of the intruders, whether by direct or indirect influence, means death. This theme has found general support in the literature of the year; that it will be prolific in practical results is more than likely, for it combines the qualities demanded by sound logic and strict scientific investigation.]

Widal, of Paris, ¹¹⁵³_{Nov. 5, '95} reviews the means of defense afforded by the lungs against inhaled pathogenic organisms. Pasteur's experiments, showing that air, when passed through a narrow tube, has a strong tendency to free itself of its germs by crowding them against its walls, is utilized by the author to exemplify the first stage, the narrow dimensions of the naso-bronchial tract and the ultimate subdivision of the bronchial tree into thousands of bronchioles fully warranting the comparison. The purpose of this stage is to bring the micro-organisms within the reach of their destroyers. To succeed in this task the bronchi bring into play, first of all, the local secretions. The innumerable glands lining the surface of the respiratory mucous membrane constantly secrete a mucus to which the corpuscles arrested by the bronchial walls adhere. This mucus exerts a bactericidal action on the microbes,

killing them as does an antiseptic, as shown by the recent experiments of Wurtz and Lermoyez. When these defensive secretions embarrass the bronchi through their abundance the mucous membrane, by reflex action, throws them off by expectoration, along with all their injurious additions that may be present.

The next means of defense, phagocytosis, is purely vital, and observed from the highest to the lowest order of the animal scale. Unicellular organisms, like amœbæ, possess means of defense against the bacteria which attack them. Infection is reduced to its most schematic expression in this fight of body against body between a microbe and a monad. Victory for the amœba results in the swallowing up, the digestion or the excretion of the parasite, and the reaction, as a whole, constitutes phagocytosis. In man, as in all vertebrata, this phenomenon can only be acted out by the cellules derived from the mesoderm, and especially the leucocytes, movable cells gifted with contractility, and which, in order to swallow up the bacteria with which they come in contact, send out pseudopodic expansions, like amœbæ. Of the four kinds of leucocytes described by Ehrlich, two only, the mononuclear and the polynuclear, possess energetic properties of defense, and even these have different phagocytic aptitudes and capacities. The polynuclear, called also microphagous, have a more rapid, but less powerful, action, and attack the less resistant microbes, as the streptococcus. The contour of the absorbed microbe becomes gradually deformed, loses its distinctness, its protoplasm contains less and less aniline coloring matter, and soon no method permits of discovering its presence in the interior of the leucocytes. The mononuclear leucocytes, more energetic in their action, operate very often in a second line, as it were, on certain resistant microbes, such as the bacillus of tuberculosis. When the polynuclear cells which have first absorbed the parasite are vanquished and become degenerated, the mononuclear cells interfere, swallowing up both the contained and containing organism, whence the term "macro-phagous." These are the cells which play the principal rôle in the formation of the giant-cell and in the histogenesis of the tubercle,—a rôle which may be re-enforced by the vascular endothelial cells or the fixed cells of the connective tissue. The Koch bacillus presents so great a resistance that it may for a long time remain in the interior of the macrophagous cell without losing its normal character. This explains why, with its affinities for staining, it is met with in the interior of giant-cells, which are but a phagocytic reaction against its invasion. In the end the bacillus may sometimes, under these conditions, be vanquished and destroyed by the phagocytes; this is a process of recovery only too

rare in man, but almost constant in certain rodents. Most frequently, however, the bacilli come off victors in the fight and break through the barriers opposed against them by the giant-cell.

Phagocytosis is thus an active and essentially vital process, to which Metchnikoff has done full justice. The leucocytes are not merely, as Buchner says, tombs always ready to receive only dead microbes; they close upon the living especially, destroying them and causing them to disappear by their own activity. Their tutelary action does not even stop here. They also absorb inert particles coming from the atmosphere or from the disintegration of tissues; they take particular charge of the coloring matter of the blood extravasated in the course of congestion of the lungs, and in this way they suffice for all the duties of pulmonary police.

R. F. C. Leith, of Edinburgh, ³⁶_{Oct., '96} shows, by an illustrative case, to what extent the defensive process may manifest itself even under circumstances which, in the light of the most advanced knowledge, would be considered as indicative of an early death. In his case an examination of the sputum revealed such a quantity of tubercle bacilli that the specimen almost presented the appearance of a pure artificial culture. Still, the man's general health, weight, and condition remained the same and his lungs were as free as ever from any abnormal signs. Twice transient, fine, moist crepitations in the second interspace were heard, but after two or three days they could no longer be detected. An intercurrent attack of appendicitis caused cessation of the cough and expectoration; but during the second week of the illness both gradually returned, the sputum being as full of tubercle bacilli as ever. The expectoration and cough then increased to such a degree that the patient was sent to Torquay, where he spent three months. Here the symptoms gradually diminished; the bacilli also. The man has continued well ever since (four and one-half years at the time of the report), and undertakes twenty- to thirty-mile journeys without fear. The author quotes the statistics of Theodore and C. B. Williams, ²¹³⁷_{v. 54, p. 112 et seq.} showing that 1000 cases gave an average duration, in 198 deaths, of 7 years and 8 months, and, in 802, of 8 years and 2 months. Many of these had lived for twenty years since their first attack.

[Cases in which the physical signs of diffuse bronchial catarrh are present with tubercle bacilli in the sputum, but without the signs of consolidation and without great impairment of the general health, are occasionally encountered. They justify the assumption that a tuberculous bronchitis may exist without giving rise to tuberculous broncho-pneumonia.—J. C. W.]

William Pepper, of Philadelphia, ¹¹²_{Dec., '96} quotes a case in which

undoubted hereditary predisposition, a sudden onset, marked physical symptoms, the sputum being crowded with tubercle bacilli, clearly pointed to miliary tuberculosis as the true condition. Twice was this patient, through a vigorous dietetic, medicinal, and climatic treatment (described in Analytical Index), in which anti-septics took no part, placed in a condition to successfully combat the tubercular process, the case being considered cured, for the time at least, when it was reported. That this may not be ranked as an exceptional event, so far as the possibility of such results being attained, is shown by Aupinel, of Paris, ²¹¹_{Dec. 29, '95} who found, in all of sixty autopsies of aged people who had died of various diseases, healed tuberculous pulmonary lesions in various degrees of evolution.

Cadéac, of Lyons, ²¹¹_{Dec. 16, '94} has demonstrated, by experiments on guinea-pigs, that particles of food remaining in the tonsillar crypts conveyed tubercular infection to the ganglia of the neck.

The two points to which G. Sims Woodhead, of London, ⁶_{Oct. 27, '94} specially directs attention, in an address on the channels of infection in tuberculosis, are, first, the tonsils and the adenoid tissue in their vicinity; and, second, the adenoid tissue of the intestine and the mesenteric glands. Careful research shows that, if these structures are healthy, they are capable of overcoming a reasonable number of tubercle bacilli.

Pulmonary Tuberculosis.

Heredity.—Edward Squire, of London, ⁶_{Dec. 15, '94} after an analysis of one thousand cases, concludes that the influence of heredity cannot be put higher than 9 per cent. of cases among the children of phthisical parents in excess of the cases occurring among the children of non-phthisical parents. He argues that the hereditary influence in phthisis is not a true heredity, but a tendency to suffer from disease—tuberculosis, among other complaints—which the offspring of phthisical parents has in common with the children of weakly parents, from whatever cause this delicacy may arise. Phthisis is essentially contagious in that without the bacillus there could be no phthisis, and that the bacillus in each case is acquired from a previously phthisical patient. The children of phthisical patients contract the disease earlier because they are exposed to the infection at home. The family house and its surroundings are, therefore, much more dangerous than the pedigree. G. Sims Woodhead ⁶_{Oct. 27, '94} also ranks heredity with such factors as insufficient and imperfect food and defective hygiene, as regards importance.

Bar and Rénon ¹⁴_{July 8, '95} found the bacillus tuberculosis in the blood of the placental end of the umbilical vein of the fœtus in

two cases in which the mothers suffered from advanced pulmonary tuberculosis. Inoculation into guinea-pigs gave positive results. In three other cases similar experiments were negative, and it appeared to the authors that a certain relation existed between the gravity of the affection and the results, as in the two cases in which inoculation of the disease occurred the mothers died of the disease soon after delivery. Schmorl and Kockel⁷⁶⁸_{B.16,H.2} also found tubercles in three placentas. In two of these the tubercular deposits were less numerous than in other maternal organs. To explain this the authors suggest that the placenta may offer greater resistance to the penetration of the micro-organisms than other organs. In all three cases tubercle bacilli were found in the placental villi, but they could be found in only one of the three foetuses. The changes produced in the vessels of the tuberculous villi consisted in the closure of vessels by the formation of hyaline thrombi, and the overgrowth of the endothelium seemed to form a barrier hindering, to a degree, the spread of tubercle to the foetal circulation.

From a study of two tuberculous cows killed during pregnancy Kockel and Lungwitz⁷⁶⁸_{B.16,H.2} are inclined to support the view of Birch-Hirschfeld, that the mode in which the tubercle bacilli pass from the maternal to the foetal circulation is by "growing through" the placenta. They are led to believe that the chorionic epithelium offers a barrier to the passage of the tubercle bacilli from the mother to the foetus. Perhaps, also, the gelatinous tissues of the foetal villi and chorion do not afford a good nutrient medium for the development of the bacilli.

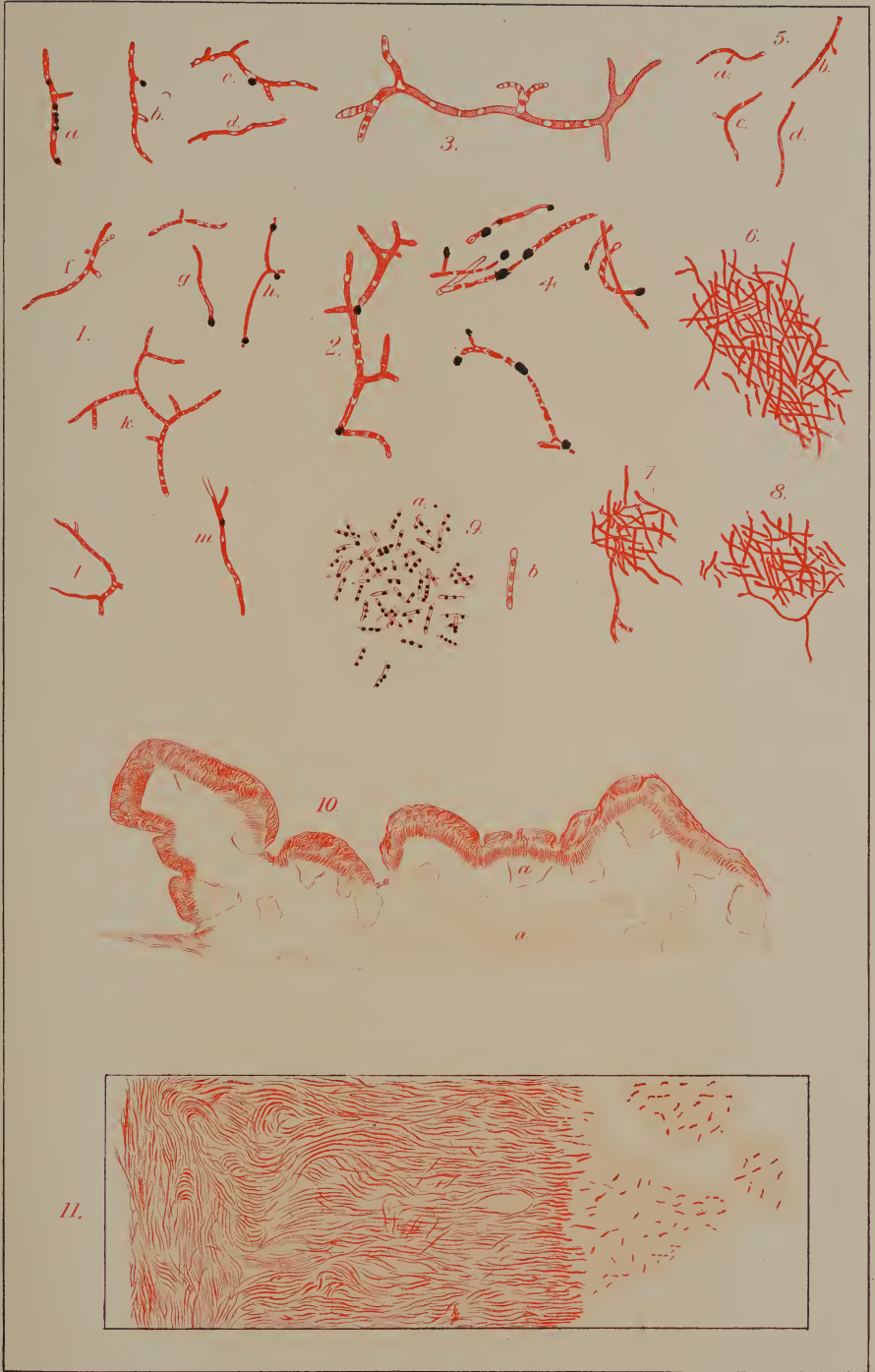
The influence of heredity upon the progress of phthisis is considered by S. E. Solly, of Colorado Springs,⁵_{Aug., '96} who analyzes two hundred and fifty cases and concludes that the percentage of females is higher among the hereditary than the acquired cases. The female hereditary cases, when phthisical, exhibit the characteristics of their sex much more strongly; they are attacked earlier and more of them die within eighteen months. Altogether, they show less resistance. The male hereditary cases exhibit relatively the same peculiarities as those in which the disease is acquired. The hereditary cases, as a whole, are attacked much earlier than those in which the disease is acquired, while the proportion of cases in the first stage, when coming under medical observation, is much greater among the hereditary. Taking all the cases in all stages together and comparing the hereditary with the acquired, the results are better among the acquired than among the hereditary, while in the first-stage cases alone there are more benefited of the hereditary than the acquired. The parental cases are

shown to do better than the grand-parental or collateral, and the acquired better than the parental, except in the first stage. In comparing the totals of the paternal, maternal, and acquired cases the writer's statistics show that the most benefited are, first, the acquired; second, the maternal; third, the paternal.

[The doctrine of heredity in the tuberculous diseases, and especially in regard to pulmonary tuberculosis, is a stumbling-block in the way of progress. Clinically, tuberculosis may be congenital and directly transmitted from the mother. But the cases are few. Infants are peculiarly exposed to infection from tuberculous parents and surroundings. The disease is then acquired. To speak of consumption as hereditary in the case of an adult who develops it, because a parent, or, still worse, because a grand-parent had it, is to strain the meaning of the word hereditary.—J. C. W.]

Pathology.—Coppen Jones, of Davos Platz, ⁵⁰_{Jan. 26, '95} expresses the belief that we should hesitate before fully accepting the prevailing view that the pathogenic element of tuberculosis is a parasitic organism which is transmissible only from animal to animal and incapable of vegetative existence outside the animal body. In the secretions and tissues the tuberculous organism presents itself mainly in the form of bacilli of various lengths, which multiply by transverse segmentation; occasionally, however, the sputum shows filamentous forms which are not segmented and which present true branches. These are always to be found in old agar cultivations. By means of cultures imbedded in paraffin Coppen Jones shows that the filiform variety of the tubercle bacillus grows only on the surface of the culture, while in the deeper parts, where the supply of oxygen is prevented, in tissues as well as fluids, short rods are to be found. The bacilli, as well as the filaments, show formations which possess many of the physical characters of spores, but which differ in various respects from the typical endospores of bacilli. The author describes peculiar bodies which he has found, under certain conditions, in the closest proximity to the tubercle bacilli, and which resemble the "clubs" of the actinomycosis fungi. The polymorphism of some of the higher fungi is referred to, and a number of observations are mentioned, which tend to show that bacteria formerly looked upon as monomorphic are only stages in the development of more complex forms.

Explanations of Plates.—Plate I.—Figs. 1 (a-m) and 2. Branched tubercle threads from sputum. $\times 1000$. (Fig. 2 $\times 1250$). Fig. 3. A filament with large vacuoles extending into the branches. $\times 1250$. Fig. 4. Forms from sputum with developed "spores." $\times 1250$. Fig. 5. Isolated filaments from a pure culture. Figs. 6-8. Portions of a pure culture compressed under the glass covering. Fig. 9. Bacilli from cavity-detritus. $\times 1000$ (bacilli $\times 1250$). Fig. 10. Vertical



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Morphology of the Tubercle bacillus (Coppin Jones)
Centralblatt für Bacteriologie.



Morphology of the Tubercle bacillus (Coppens Jones)

Centralblatt für Bacteriologie

section of an agar-pure culture. *c*, culture; *a*, fragments of agar. Fig. 11. A portion of the same highly enlarged.

Plate II.—Figs. 12–16. Clubs and clubbed masses in tuberculosis. Figs. 17–21. Clubs and clubbed masses in actinomycosis. Fig. 22. *Penicillium* fungus. Fig. 23. Chlamydospore-formations in phycomycetous fungi.

Maragliano ¹²¹⁰_{Apr. 15, '96} explains the varying course of phthisis in different subjects by the absence or presence of micro-organisms other than the tubercle bacillus. In his opinion, the tubercle bacillus is responsible for the tubercle nodule solely, and for a certain diminished resistance of the tissues created by its proteins or its toxins, and so rendering them more susceptible to the attacks of other micro-organisms. It is to these latter that we owe the pneumonic and caseous foci so frequently found in the course of phthisis. Unless other micro-organisms appear the tubercle bacillus may give rise to no symptoms during life; occasionally, in fact, tubercular nodules are found post-mortem the existence of which was never suspected during life. Most of the secondary symptoms of phthisis—fever, wasting, broncho-pneumonia—are, according to the author, due to mixed infection.

Mixed infection was also studied by Spengler. ⁵⁸_{B. 18, p. 343; June, '96} ⁵ In the opinion of this author, only a small percentage of cases of pulmonary phthisis may be said to represent pure tubercular disease. In such cases, if there is fever, the anatomical alterations are always more extensive than can be made out by physical examinations. The cases may be divided into “active,” with fever, and “passive” cases, in which streptococci are present in the sputum, but in which there is no fever. The distinction is made by the sputum examination. Usually, in such cases, the streptococci infect the lung-tissue and cause inflammation; this, in turn, produces the characteristic symptoms of phthisis, such as night-sweats, loss of appetite, etc. The severity of the symptoms depends on whether normal tissue or cicatricial tissue is affected, and on the extent of the primary and secondary disease. Streptococci sometimes produce closed abscesses in the lungs, and, from the absorption of toxic substances from these, high temperatures occur. In addition to streptococci, tuberculosis of the lungs may be complicated by Fränkel’s diplococcus tetragenus; rarely staphylococci, influenza bacilli, etc. In all cases it is difficult to determine whether fever, if present, is due to the tuberculosis or the complication. In climatic treatment the mixed infection disappears frequently, while the tubercular disease remains.

Henry L. Elsner, of Syracuse, ¹⁷⁰_{Nov., '94} in support of the view that tubercle bacilli can, without the presence of added bacterial infection, cause changes in the lung, giving rise to symptoms of acute pneumonia in chronic or latent phthisis, which cannot be differ-

entiated without bacteriological examination from non-tuberculous pneumonia, reports a case in which croupous pneumonia attacked an area of lung-tissue already the seat of a latent and infiltrating tuberculosis. The croupous process, thoroughly typical and characteristic, certainly quickened the dormant tuberculous affection into activity.

A case similar to this is reported by Kinnicut.⁵⁹_{Oct. 11, '94} In similar cases Tedel²¹³⁴_{'95} sometimes found the tubercle bacillus only in the lesions of typical tuberculosis, no bacilli whatever being present in the pneumonic foci. Many papers were published in support of the mixed infection, which, however, only present corroborative value.

In a comprehensive review of pulmonary tuberculosis and mixed infection J. Barozzi¹⁰⁵¹_{Dec., '95} takes a view midway between the two theories advanced at the present day,—of a microbial entity and a mixed infection,—believing that the possibility of microbial combinations is a fact which to-day requires no further demonstration and too solidly based to be contested by any one. Not only do these associations exist, but it has also been proven that, far from being curiosities of the laboratory, they are nothing less than inoffensive to the organism invaded by them. Clinical experience furnishes innumerable examples of this. It is difficult to understand why pulmonary tuberculosis should be proof against secondary infections when these same infections are met with in so many other localizations of the same disease,—in the skin, glands, meninges, etc., and especially in tuberculosis of the bones and joints, where pyogenic microbes play a considerable rôle, well known and feared by surgeons. Maclaure³⁶⁰_{Jan., '96} regards articular tuberculosis with associated microbes as having a special character, differing from the pure articular form and having a much graver prognosis.

Gaucher and Sergent⁹²⁷_{May 3, '95} report the results of the autopsy on a case of mixed infection of the aspergillus fumigatus and the tubercle bacillus occurring in a pigeon-feeder. They conclude, after carefully studying the literature of the subject, that in cases of mixed infection the aspergillus first attacks the lung and paves the way for the tubercle bacillus; when the latter has gained a foot-hold the aspergillus disappears, leaving a very chronic form of tuberculosis, with a strong tendency to the formation of fibrous tissue and the disappearance of the bacilli. Rénon¹⁴_{Oct. 30, '95} observed two cases of aspergillous tuberculosis in two hair-combers, husband and wife, but, besides the fact that the dust arising from the hair (collected by rag-pickers) was found to contain aspergillus, it was demonstrated that the rye-flour used by the patients also contained

it. As is well known, cases of keratitis due to *aspergillus* have been observed among farmers.

Sauvage, ²⁰⁰⁰₁₉₀₆ from a study of the nutrition in diabetes and tuberculosis, concludes that there is a tendency of both affections toward the same end,—viz., diminished nutrition and destruction of the organism, abundant elimination by the urine of organic and mineral *débris*, diminished respiratory function, etc. In diabetes the tissues, becoming impregnated with sugar, prepare the soil for the tubercle bacilli, and, together with the other causes of vital fatigue, render the organism quite defenseless against invasion by bacilli.

Leredde, ³⁶⁰_{Jan., '95} states that necrosis of the visceral epithelium is frequent in tuberculosis when the disease assumes an acute or sub-acute form. It sometimes attacks the liver and kidney simultaneously, and is then associated with necrotic changes in the connective and vascular elements. It may occur independently of the presence of tuberculous granulations in the affected organs, and is apparently due to the action of tuberculous toxins in the blood.

[The microscopical areas of necrosis in the viscera in diphtheria and in enteric fever lend support to this view.—J. C. W.]

Sarda and Virès, ³¹⁸_{Nov., '94} had under observation for a long period seven patients of arthritic diathesis with tuberculosis, and in one case, which came to autopsy, both lungs were found studded with small cavities, mostly obliterated or cicatrized by the formation of fibrous connective tissue. The patient was 64 years old, markedly arthritic, and the pulmonary affection dated back twenty-six years, beginning with a severe hæmoptysis, to which arthritic tuberculous patients seem to be especially liable. She died of fibrinous pneumonia. The authors consider that their case supports the view that there is an antagonism between the arthritic diathesis and tuberculosis, which, while not sufficiently strong to prevent the co-existence of the two diseases, markedly retards the progress of the pulmonary affection.

Revilliod, of Geneva, ¹⁰⁵¹_{Oct., '94} has studied the relations of diphtheria and tuberculosis, and concludes that there is a family predisposition in both, and that a soil favorable to diphtheria is equally favorable to tuberculosis. The theory, however, is one which requires clinical evidence to support it. At the autopsy of several children dying from diphtheria in spite of antitoxin injections, Variot, ¹¹³⁹_{No. 3, '95} found tubercular lesions, and he is inclined to believe that the association of the two affections is not uncommon and is always grave. Naturally, an organism already undermined by the possibly latent tubercle bacilli offers a good soil for the diphtheria bacillus. The author quotes Pilliet and Barthez as

having already pointed out the gravity of the association of the two affections.

Gibotteau²⁰⁰⁰₁₉₄ has collected eighteen cases tending to confirm the assertion that hysteria influences favorably the evolution of pulmonary tuberculosis, not only modifying the symptoms, but also retarding the progress of the affection. The relations of scrofula or rheumatism with hysteria may, to a certain point, explain this influence; but the chief cause, in the opinion of the author, lies in the general slackening of the processes of nutrition and evolution, so remarkable in hysteria.

O. Strauer,¹¹⁴_{B.24,H.3} under the direction of Grawitz, made experiments to determine the number of red and white blood-corpuscles, the dry constituents of the blood and serum, and the specific gravity in patients suffering from phthisis and cancer. He drew the blood from the superficial veins of the forearm. In phthisis, in the first stages, characterized by pallor, he found a diminution of the red blood-corpuscles, the dry constituents of the blood and serum, and of the specific gravity. In advanced phthisis with cavities, with but little or no fever, but with pinched and blue appearance, the relative values were about the same as in healthy persons. If, on the contrary, the patients had constant fever and the general strength was diminished, the figures were decidedly lower. A complication of tuberculosis of the lungs and of the larynx only caused changes in the blood when persistent vascular engorgement was induced by laryngeal stenosis. Here, as in diseases of the heart, there was a thickening of the blood, notwithstanding pronounced cachexia. In contradistinction to the conditions of the blood in phthisis; the number of red blood-corpuscles, dry constituents of the blood and serum, and the specific gravity in cancer diminished more and more as the cachexia developed. Anæmia was generally accompanied by an augmentation of the white blood-corpuscles, the condition of which varied greatly in phthisical subjects. A further difference was that in tuberculosis the form of the red blood-corpuscles remained the same, while in advanced stages of cancer, on the contrary, they presented all the forms of poikilocytosis.

In studying tuberculosis of various organs in man and experimental tuberculosis in the rabbit and guinea-pig O. Falk²⁰_{B.139,H.2,195} gave special attention to the amount of fibrin present in the granulations, finding it constantly present in those of the interstitial tissue of the human lung and in the vessel-walls. An analogous fibrin was seen in the tubercles of other organs, its production being attributable to the action of the tubercle bacillus. It was very rarely noted in the rabbit, but in the guinea-pig the con-

ditions were always found to be similar to those of the human organism.

The tuberculosis of infancy has been studied by H. Kossel, ⁵⁸_{B.21,H.1} both clinically and anatomically, in 22 patients from 2 months to 5 years of age, all dying of tuberculosis, and in 14 other children succumbing to various other affections, but in whom autopsy revealed local lesions of tuberculosis, either in the bronchial or mesenteric glands, which had been entirely latent during life. Besides two orders of lesions,—the one generalized and hæmatogenous, the other localized and propagated by the lymphatic glands,—other alterations are present in such cases, especially when the disease is of some duration. Disseminated foci of broncho-pneumonia may be noted, very probably due to the penetration by aspiration into the lobes of the lung of the products of tuberculosis. The bacillus of Koch may be found in great abundance in these foci, but not always alone; Kossel has frequently observed streptococci and influenza bacilli and in one case the pneumococcus of Fränkel. Indeed, this coincidence was so frequent that the author was led to question whether the opinion of Fränkel and Troje, that the bacillus of Koch is sufficient in itself to produce areas of caseous broncho-pneumonia, is really true in infantile pathology.

One of the most important facts determined by the author as to the pathogeny of infantile tuberculosis was the almost constant alteration of the bronchial glands,—an alteration almost always, if not always, of longer standing than the pulmonary lesions. In other words, the lymphatic glands would apparently constitute, in the child, the first stage of tubercular infection.

Concerning the relative conditions of weight of the body and of the organs in young tuberculous subjects, Oppenheimer ³⁴_{p.467,'95} states, after a study of three hundred and five cases observed at the Munich Pathological Institute, that the heart of phthisical subjects is, relatively to the body, decidedly too small at the time of puberty, and that this deficient size cannot be the result of emaciation of the body in general. The author therefore concludes that a small heart predisposes to tuberculosis.

F. S. Parsons, of Philadelphia, ²¹³⁰_{'96} claims that primary tuberculosis is primarily due to lymph-stasis, congenital or acquired, and that the tubercle bacillus is the phenomenon expressive of the disease, that it is therefore symptomatic and not etiological, and that the so-called scrofula is merely a pretubercular stage. Karl von Ruck, of Asheville, N. C., ⁵⁹_{May 25,'95} takes exception to what Parsons calls the "pretubercular" condition, which, in his opinion, is not only early, but genuine, tuberculosis. Moreover, he does not believe that ulceration and suppuration are produced by stasis

alone. The products of tuberculosis, as we find them, are not due to stasis, but to bacillary invasion. Experiments on animals are far too complete for us to doubt this.

Thomas J. Mays, of Philadelphia, ⁸¹⁴_{Oct. 16, '96} expresses his conviction that the foundation of pulmonary consumption lies not in the bacillus, but in the nervous system in general and in the nerve-supply of the lungs in particular, and that any influence which weakens the nervous system also has the power of producing this disease. This view, in his opinion, explains its greater prevalence among the nervous, insane, and feeble-minded, because here the nervous system is already debilitated; it also explains why alcohol, mercury, and lead greatly predispose to this disease. They are all active poisons of the nervous system. The weight of the testimony distinctly points out that pulmonary consumption is not a contagious disease.

[That a depraved nervous system plays an important rôle in the development of the disease by increasing the vulnerability of all the organs exposed is not to be doubted, but to declare that the weight of testimony distinctly points out that pulmonary consumption is not a contagious disease is, to say the least, subject to challenge.]

Propagation.—Bec, of Avignon, ¹⁴_{Feb. 27, '95} relates three epidemics in small rural communities in the Basses-Alpes which tend to further prove the infectious character of the disease. A young girl from Preynes, a hamlet of 46 inhabitants, returned from a short visit to Marseilles with acute tuberculosis, which rapidly proved fatal; in less than a year four young girls, her constant companions, died from the same disease. At Majastres, a village of 202 inhabitants, 12 persons died within three years from tuberculosis, following the arrival of a case in the village, and similarly 18 deaths occurred among 418 inhabitants at Brunet during seven or eight years, 3 fatal cases first occurring within seven days. In the latter village the hygienic conditions are better and the prosperity of the people is also greater,—two facts which would account for the lessened mortality, as in the other hamlets the houses are small and the simplest rules of hygiene are neglected by the occupants. The assertions of Bec are confirmed by the personal observations of d'Hôtel, of Poix-Terron, ²¹³¹_{'94} in a similar community.

C. O. Maisch, of New York, ⁵⁹_{Oct. 13, '94} gives a striking instance of the infectivity of phthisis pulmonalis occurring in his practice. The patient, a German, 62 years old, weighing about 200 pounds (91 kilogrammes), of good family and personal history, came to him in a state of advanced consumption. Two years before this man lost a son, aged 23, from pulmonary tuberculosis. Three

months later his wife, who had nursed the son, began to sicken. She was a German, 59 years of age, strong, robust, and well preserved, weighing more than 220 pounds (100 kilogrammes), with a good family history. She died within twenty months, having had frequent hæmorrhages from the lungs and intestines and almost constant diarrhœa. Within five months the husband was in the condition just described, while a daughter, aged 22, worn out from constant attention to the sick, was in a fair way to become phthisical, if not already so. It was learned that all three had expectorated on the walls, floors, and in the corners of the apartment, the man preferring to expectorate under his bed. The daughter sleeps in the same room with the sick man, and slept beside her mother during her illness.

[A similar instance came under my observation. A family consisting of the parents and seven children lived in the same house. There were four daughters and three sons, all unmarried. All were in good health. They were thrifty working-people from the north of Ireland. The house was small and overcrowded. To this house came the sister of the mother, ill with pulmonary tuberculosis, which had developed some months before in a distant town, where she had been for some time as a servant. She was about 50 years of age. The case was a rapid one and terminated fatally in the course of a few months. There was an abundant expectoration. Several members of the family developed consumption within a year and died, some within a few months, others in the course of three or four years, in the following order: The youngest daughter, aged 16; a son aged 20; the mother; the oldest son, aged 35, and the father. Three daughters and the youngest son survive, two presenting signs of slowly-advancing chronic pulmonary tuberculosis.—J. C. W.]

Cornet¹⁴_{May 26, '95} states that the measures of prophylaxis taken by the German authorities in relation to tuberculosis have not been without result. Since 1887, when these measures were instituted, the statistics show a marked diminution in the mortality from the disease. For instance, in the Prussian prisons, the deaths per 10,000 inmates from tuberculosis were 118.9 from 1875 to 1876, 140.8 from 1878 to 1884, 174.7 from 1884 to 1887, 101 from 1887 to 1890, 89.4 from 1890 to 1892, and only 81.2 from 1892 to 1894. In Prussia, from 1875 to 1886, the general mortality from tuberculosis was more than 30 per 10,000 inhabitants; since the application of prophylactic measures it has fallen below 25, and a similar diminution is noted in the other German States. In Saxony the mortality has, since 1892, fallen from 25 to 21; in the Grand Duchy of Baden, from 30 to 26, and so on. This is no

mere coincidence, and the dissemination of tuberculosis, in the opinion of Cornet, should be combated with more energy than ever. In the discussion Virchow expressed himself as being entirely in accord with the speaker, and regretted the apathy and indifference of individuals on the subject. At the University of Berlin, though cuspidors had been provided, the students neglected to make use of them, and, in spite of the notices of railroad companies, travelers continued to expectorate on the floors of the carriages.

Marfan, ⁷³ _{Mar. 30, '95}; ²¹³ _{Aug.} as well as other writers, has called attention to the risk run by those who are employed in the Paris hospitals of taking tuberculosis in some form. He says it decimates the lay attendants. At the Hôpital Necker half the attendants take phthisis. Those who attend to their duties with the greatest zeal and devotion are most likely to be affected. It is chiefly those who work in the medical wards who suffer; attendants in the surgical department are usually spared. Debove and Landouzy have also pointed out this danger; the hospitals of Paris constitute a permanent source of danger not only to the patients admitted, but to their own employés. The remedy is, of course, isolation of tuberculous patients and protection, in this way, of the non-tuberculous. It is singular, but true, that this also protects the hospital staff, no doubt through the hygienic precautions taken and the careful attention to disinfection.

Doischevallier cites the results obtained in the Brompton Hospital, where fifteen thousand cases of phthisis were treated in twenty years. No doctor, chaplain, superintendent, or other official, male or female, became affected with pulmonary disease. The accommodation provided in the Parisian hospitals for humbler members of the staff is unsatisfactory and it is calculated to manufacture patients for the wards.

Landouzy gives the results of some researches made by Lalesque, of Arcachon, and Rivière, of Bordeaux, ⁴⁴³ _{Nov. 20, '96} on the virulence of the dust in the chambers of tuberculous patients with purulent expectoration. The rooms were carefully disinfected, the tissues with a Geneste and Herscher stove, the furniture wiped with a cotton cloth dipped in a 1 to 1000 corrosive-sublimate solution, the floor washed and scrubbed and then washed with the solution. The dust was taken from the places most difficult to disinfect, as the corners, etc., and inoculated into 78 guinea-pigs. Of these 57 survived, the others dying within a few days from tetanus or septicæmia. On the fortieth or forty-fifth day the survivors were sacrificed and no tubercular lesion was found in any of them. The experiment proves that the methods of cleans-

ing and disinfection now usually employed are entirely efficacious in preventing contagion by the inhalation of dust. There is thus no need of apprehension as regards sanatoria for tuberculosis if disinfection is completely carried out.

The propagation of bovine tuberculosis by faecal matter has been studied by Cadéac and Bournay, of Lyons, ²¹¹_{Dec. 1, '96} who found the Koch bacilli constantly present in the excrement of a young bull to which tuberculous lung from an adult cow had been given with the food. Their experiments show that the faecal matter is virulent and capable of propagating tuberculosis to the same degree as is the sputum of man.

Paula Nogueira, of Lisbon, ⁶⁷³_{May, '96} calls attention to the frequency of bovine tuberculosis in Portugal. Of 567,840 adult animals examined 1136 were found to be phthisical,—a proportion of 0.2 per cent. In Portugal, as elsewhere, the animals giving the most milk are those most frequently affected. But, a curious fact, the animals belonging to the race employed for bull-fights seem to be especially subject to the disease, although they live in the open air and almost in a wild state. Nocard ²¹³²_{'96} says that, according to districts, 10, 15, 25, or more per cent. of the cattle are affected with tuberculosis. In stables where tuberculosis has existed for some years the proportion of tuberculous animals is always considerable, 50, 60, or even 80 per cent. being affected.

Frank S. Parsons ⁵⁹_{May 25, '96} believes that the danger of tuberculous infection by milk is greatest to the weak and those predisposed by heredity. Alexandre ⁷³_{Sept. 29, '94} finds only a proportion of 3.4 per cent. per 1000 tuberculous cows among 20,000 examined in the Department of the Seine. He therefore holds to his opinion that the consumption of the flesh and milk of our domestic animals is not the cause of the terrible mortality from tuberculosis among mankind. It is important, he says, that this once-accepted belief be thoroughly rooted out of our minds.

Striker Coles ¹¹⁹_{Nov. 3, '94} reports the discovery of tubercle bacilli in human milk. The milk of 5 cases was examined by D. Braden Kyle, with every precaution to secure reliable results. He found the bacilli in abundance in 2 cases that had marked tubercular symptoms,—hæmoptysis, cough, night-sweats, etc. In the other 3 cases no bacilli were found in the milk, but in these tuberculosis was doubtful,—1 had supposed tubercular ulcer of the labia, and the other 2 gave tubercular family histories, but had no definite symptoms of tuberculosis. The mammary glands of both cases in which the milk contained the bacilli were apparently free from disease, and there were no fissures or ulcers about the nipples.

Pansini ⁵⁰⁵_{Feb. 7, '96; Mar. 2} has been experimenting on chickens and

guinea-pigs, with tubercle bacilli and with the tuberculous products of human tuberculosis, to find out the relation, if any, between avian and mammalian tuberculosis. He concludes that, in man and mammals, there exist cases of tuberculosis of the avian type. The clinical history of the phthisical from whom the expectoration was taken did not differ in any noticeable degree from the usual type. Apparently the bacilli of human tuberculosis artificially grown are less virulent than when used direct.

The same subject has been studied by Cadiot, Gilbert, and Roger,¹⁴_{Dec.11,'95} who, in previous researches, have shown that human tuberculosis inoculated into 6 hens caused tubercular lesions in 5 of them. In another series of experiments they inoculated 40 hens, and 4 of these became tuberculous. It may thus be stated that human tuberculosis is inoculable into fowls in a proportion of 10 per cent. The receptivity of the parrot to human tuberculous virus is, according to the same authors,¹⁴_{Dec.18,'95} greater, as, of 3 parrots inoculated, the disease developed in all. As is known, the parrot often becomes spontaneously tuberculous, and, from the experiments of the authors, it appears that these lesions are of human origin. It also appears that the parrot, in turn, can convey the infection to man.

Local Infection.—A conclusive demonstration of the inoculability of tuberculous matter was given by Hutchinson²²_{July 3,'95} in two cases of tattooing in boys, the marks having been made by an elder brother who used his saliva to moisten the pigment, and who died fourteen days later, of phthisis. Microscopical examination showed the presence of tubercle beneath the corium. G. Sims Woodhead⁶_{Oct.27,'94} considers direct inoculation into the tissues very rare, though he concedes its possibility.

Several interesting instances of contamination through the skin were related at the meeting of the American Dermatological Association. J. C. White, of Boston,⁹⁹_{Dec.5,'95} described the case of a young girl who had washed the handkerchiefs of a parent who died of phthisis, and in whom the disease soon developed. Another case showed characteristic tuberculosis of the lobes of both ears gradually coming on for eight years. The ears had remained long inflamed after piercing for ear-rings and never healed. The woman who bored the ears died soon after, of consumption; the sister who dressed the ears died also of the same disease. The operator may have wet her needle or end of the silk in the mouth, or subsequent dressings may have caused the infection, or bacilli may have entered through the medium of the air. In the discussion Hartzell described a case of undoubted local infection. A child's father had died of consumption three months previ-

ously. The lesions on the child were one at the metacarpal joint of the thumb, one upon the knee, and another upon the opposite leg,—in fact, in just such situations as a child exposed to tubercular sputum could become infected when crawling over the floor. The suggestion was obvious. Graham related the history of a case of a girl who had been nursed by her mother. Contrary to instructions, the latter washed the handkerchiefs, etc., used by her daughter for expectoration. She developed several tuberculous sores about the knuckles, and three or four months afterward also developed phthisis.

Dobroklonsky, ⁵⁸⁶
Nos. 19, 20, '96 from a number of careful experiments, concludes that tubercular infection may be conveyed through the genital apparatus from man to woman and *vice versâ*, but only when there are present in these organs tubercular foci,—a condition rarely met with. This method of infection, therefore, in comparison to others, is but of secondary importance; however, as local tubercular processes in the genital apparatus, either in the male or female, may take such a course as not to cause general infection or threaten life, and may even be latent, existing without the knowledge of the patient himself, it must be admitted that such persons may be a source of infection during a long period of time, and, under certain conditions, may spread the disease. (Report of Corresponding Editor Drzewiecki, Warsaw.)

Jäckh ²⁰
B. 142, H. 1, '95 has endeavored to determine the presence of bacilli in the genital glands of tuberculous individuals, examining the semen, the testicles, and the ovaries, the fluid as well as the organs of patients dying from the disease being taken with all the usual precautions and inoculated into guinea-pigs. The animals were then sacrificed, at periods varying from eight weeks to three months. From his results it appears that the eventual existence of tubercle bacilli in the semen of tuberculous individuals must be considered as certain.

Walther ⁷⁶⁸
B. 16, p. 274 has, however, never been able to find the tubercle bacillus in the genital apparatus of phthisical patients, after extensive research and inoculation experiments on animals with secretions from these patients, and he therefore claims that infection in that manner must be of rare occurrence.

Complications.—In a clinical lecture on tubercular endocarditis and endocarditis in tuberculosis, Giraudeau, of Paris, ¹⁴
July 24, '96 having eliminated successively all the usual causes of mitral endocarditis in a case forming the text of his lecture, was led to question whether a tuberculous coxalgia had not formed the starting-point of the disease, and whether, in the absence of any discoverable pulmonary lesion, the mitral sclerosis could not be

attributed to the action on the mitral valves of the tuberculous toxin secreted by the bony abscesses. This hypothesis leads to the further question whether tuberculous lesions other than those of the lungs—as, for instance, adenopathies, osteitis, and arthritis, so frequent in childhood—are not capable of determining sclerosis of the endocardium,—the mitral stenosis so long regarded as congenital. Clinical observation only can prove this hypothesis.

According to Leyden, of Berlin,⁴_{Dec. 9, '95} the statement that tuberculosis does not affect the heart is incorrect, as it may be observed in a half or a third of the cases of miliary tubercle; of greater interest, however, is the affection of the endocardium, and especially the valves, the acute form of valvular disease depending on bacteria, whether through direct or indirect influence. Endocarditis is produced by a great number of micro-organisms. The simultaneous presence of endocarditis and tuberculosis has frequently been noted, although the bacilli were seldom found. In a case seen by the author, that of a woman with advanced phthisis, who had formerly suffered from rheumatism, the autopsy confirmed the diagnosis, numerous bacilli being found, especially in thrombi.

Michaelis, of Berlin,³_{July 24, '95} has been able to examine several cases of endocarditis in phthisical patients and has always found the bacillus of tuberculosis, though in limited numbers. They were usually met with in the cells, more rarely in the caseous portions and the points at which there was an agglomeration of red corpuscles.

Moncorgé, of Mont-Dore,²²⁸_{May 15, '95} reports a case of periodical paroxysmal tachycardia in a tuberculous patient. The attacks occurred from the 15th to the 20th of each month, and lasted from twenty to twenty-four hours. In one of them the pulse reached 210, but was very regular. The periodicity of the attacks was difficult to explain.

Jaccoud, of Paris,³¹_{Feb. 9, '95} in describing the case of a patient suffering from pulmonary, as well as renal, tuberculosis, states that one of the symptoms revealing the latter affection is true hæmaturia, characterized by the presence of hæmatins in the urine. The uniform color of the urine throughout micturition and the presence of casts indicate the renal origin of the hæmaturia, while the absence of vesical phenomena show that the hæmorrhagic process is limited to the kidney. From the presence of evident signs of pulmonary tuberculosis, however, one is not justified in concluding that the renal lesion is tuberculous, for this manifestation is rare in pulmonary tuberculosis. It is necessary to ascertain whether the patient has had no previous disease leading to chronic nephri-

tis, and, if malaria, syphilis, and infectious diseases can be excluded, the diagnosis may be considered to rest between cancer and tuberculosis.

A careful review of the literature and a report of four cases of combined cancer and tuberculosis is given by Georges Clément, of Hagenau, ²⁰_{B. 139, H. 1, '95} who arrives at these conclusions: 1. That the association of cancer with tuberculosis of the lymphatic glands in the neighborhood may be mistaken for metastatic foci. 2. That the general and local influence of cancer (probably chemical) and the resulting inflammation may rouse into activity a latent tuberculosis. 3. That through this same influence certain portions of the body may alone be attacked by tuberculosis, while, under all other conditions the disease would rarely affect these regions (axillary glands, liver). 4. That the development of an ulcerating neoplasm in a previously tuberculous lymphatic gland may be mistaken for secondary tuberculous infection of the tumor. A case of pulmonary tuberculosis complicated by epithelioma of the larynx, in a woman of 33 years, is noted by Percy Jakins, of London, ¹¹_{Mar., '95}

E. D. Bondurant, of Tuscaloosa, ¹_{Feb. 23, '95} states that during three years and nine months, beginning October 1, 1890, 295 deaths occurred among the 1700 patients treated at the Alabama Insane Hospital. Of the 179 deaths among white patients, 51—28 per cent.—were due to tuberculosis; of 116 deaths among negro patients, 49—42 per cent.—were due to tuberculosis. A post-mortem examination was made in 163 of these 295 fatal cases,—91 white and 72 colored. No signs of tuberculosis, past or present, were discovered in 72 cases,—41 white and 31 colored; that is, 55 per cent. of the white patients and 57 per cent. of the colored patients coming to the autopsy-table exhibited the lesions of either a still active or a formerly existent tuberculosis.

As regards the comparative susceptibility of the two races, it would appear that the mortality from tuberculosis is greater in the negro than the white race; that in them it runs a more rapid course and is rarely cured or arrested, becoming much more widely diffused throughout the bodily tissues and organs.

[This observation is in accord with the general experience in the North.—J. C. W.]

As regards the association with insanity, the author's results show that, while more than half of the patients in the insane hospital at some time suffer from tuberculosis, one-third of those who contract the disease make a good stand against it, either entirely recovering or living for a term of years without being injuriously affected by small, though unhealed, foci of tubercu-

losis, or dying from some other cause in the course of a very mild and chronic form of the disease.

J. W. Babcock, of Columbia, S. C., ²⁷⁸_{Oct., '94} attributes its frequency among the insane to hospitalization, it being two or three times as common in institutions as in the general population, the chronic insane being the most liable to tuberculosis.

René Jacquet, of Reims, ¹¹⁵³_{June 8, '96} has studied the relations of tuberculosis of the lungs and syphilis, and concludes that there is no worse combination than these two diseases, and that all syphilitic patients, especially those in whom manifestations have appeared in the mouth, pharynx, or larynx, should avoid any possible infection by the tubercle bacillus, and practice careful antisepsis of the buccal cavity.

A case of acute meningitis in a patient suffering from advanced phthisis is recorded by L. Vintras, of London. ²²_{July 24, '96} A venous hæmorrhage from the lung ended fatally. A fatal case of purpura hæmorrhagica in a tuberculous patient is related by L. Galliard and Marchais. ⁹⁹⁶_{Oct. 25, '96} Etienne and Specker ⁹²_{May, '96} describe a rare case of medical septicæmia secondary to tuberculosis, multiple cutaneous nodules, icterus, hæmorrhage, and a subacute evolution, ending in death. A case of multiple abscesses of the liver and extensive tuberculosis is related by Bruce, of New York. ⁵⁹_{Aug. 31, '96}

Diagnosis.—Otis, of Boston, ⁹⁹_{Apr. 11, '96} attaches considerable importance to the value of spirometry, pneumatometry (or the measure of the elastic power of the lungs), and the measurements of the circumference and diameters of the chest in natural and full inspiration.

These tests are of especial value in those incipient or suspected cases before we obtain any positive evidence of disease by auscultation and percussion. A class of cases in which any and all means of examination which will lead to a diagnosis are of especial value, for the earlier the diagnosis is made and the treatment begun the better the prospect of arrest. Further, they naturally suggest a valuable means of treatment,—namely, gymnastic exercise especially directed to chest- and lung- expansion.

The capacity of the lungs in health varies, in the first place, according to age, sex, and stature; and, secondly, according to the height, width, and depth of chest, mobility of the chest-walls, and also, which is of especial note, according as one has or has not been in the habit of fully expanding the lungs,—practicing breathing exercises. In 1000 measurements for an average height of 67 inches (170.2 centimetres) and an average age of 22.1 years, the average lung-capacity was 240.6 cubic inches (3.944 cubic centimetres). In 8000 measurements by Hitchcock, of Amherst

College, for an average height of 67.9 inches (172.5 centimetres), and at an age of from 17 to 26 years, the average lung-capacity was 230 cubic inches (3770 cubic centimetres). In 15,000 measurements of students, at about the same age as those tabulated by Hitchcock, collected by E. Hitchcock, Jr., of Cornell University, the average lung-capacity was 236.6 cubic inches (3880 cubic centimetres) for an average height of 67.8 inches (172.2 centimetres). He has also made, from his own measurements of males from 16 to 40 years of age, averages of the lung-capacity for heights from 66 to 72 inches, each average being the result of fifty observations, with the following results:—

Height.	Lung-Capacity.	Average for each Inch or Centimetre in Height
66 to 67 inches, inclusive.	231.62 cubic inches.	3.4 + cubic inches.
167.7 to 170.3 centimetres.	3797 cubic centimetres.	22.4 cubic centimetres.
67 to 68 inches, inclusive.	237.10 cubic inches.	3.46 cubic inches.
170.3 to 172.8 centimetres.	3903 cubic centimetres.	22.7 cubic centimetres.
68 to 69 inches, inclusive.	244.44 cubic inches.	3.5 cubic inches.
172.8 to 175.4 centimetres.	4007 cubic centimetres.	23.06 cubic centimetres.
69 to 70 inches, inclusive.	259.34 cubic inches.	3.66 cubic inches.
175.4 to 177.9 centimetres.	4250 cubic centimetres.	24.06 cubic centimetres.
70 to 71 inches, inclusive.	261.38 cubic inches.	3.64 cubic inches.
177.9 to 180.5 centimetres.	4284 cubic centimetres.	23.9 cubic centimetres.
71 to 72 inches, inclusive.	261.34 cubic inches.	3.5 cubic inches.
180.5 to 183 centimetres.	4284 cubic centimetres.	23.03 cubic centimetres.
General average		{ 3.52 cubic inches. 23.19 cubic centimetres.

From this data he finds that, in males between 16 and 40 years of age, for each inch in height the lung-capacity is 3.5 cubic inches, or 22.5 to 23 cubic centimetres for each centimetre of height. From the observations of Hutchinson and Wintrich, Brehmer gives it as between 22 and 24 cubic centimetres for every centimetre in height; but 23 is a good working basis, and quite sufficiently accurate.

For women he quotes the measurements of about 500 students taken at Mt. Holyoke and Wellesley Colleges by Colton and Miss Wood, which give, for an average height of 62.6 inches (159.1 centimetres), an average lung-capacity of 145.8 cubic inches (2390 cubic centimetres); and also 50 per cent. of 1500 Wellesley students, the observations made by Miss Wood for a height of 63.2 inches (160.5 centimetres), giving a lung-capacity of 150.3 cubic inches (2447 cubic centimetres). The average age in each case was about 19 years. From this we find that, with women, for every inch in height the lung-capacity is about 2.3 cubic inches, or 15 cubic centimetres for each centimetre. Brehmer makes it a little higher,—between 16 and 17.5 cubic centimetres. Hutchinson found in his investigations, made many years ago, that the lung-capacity varied from 174 cubic inches for a height of 5 feet to 262 cubic inches for a height of 6 feet, or for

every inch of stature above 5 feet the lung-capacity increased 8 cubic inches.

If the spirometric calculation fall much below this, either the patient's method of breathing is not normal or his lungs are in fault. The former can be ascertained by the measurement of the chest in repose and in full expansion. In early phthisis the lung-capacity is generally much below the average. If the general symptoms are suggestive of phthisis, and yet the vital capacity is up to or beyond the normal, this is evidence against lung disease. If phthisis is present the test of vital capacity is also a factor of more or less importance in prognosis. The author prefers the water spirometer. The measurement of the elastic power of the lungs is made by the pneumatometer or pressure spirometer. In early phthisis the inspiratory power is lessened, the expiratory remaining normal. In thoracometry a measurement is made on a level with the nipple and another two inches below it. These are taken in repose and after inflation. The shape of the chest can also be ascertained. The sum-total of these tests supplements knowledge obtained by auscultation and percussion.

Grancher ¹⁴ _{July 10, '95} ⁶⁷³ _{Oct., '95} establishes an early diagnosis in tuberculosis by observing the roughness of inspiration. When this symptom is present it is sufficient, but when it is associated with functional signs the diagnosis is confirmed. It is certain that simple bronchitis causes an alteration in physiological respiration, lasting for some time; a slight irritation of the mucous membrane of the lesser bronchi, a slight rugosity of the pleura will sometimes cause persistent respiratory murmurs. When, however, inspiratory roughness is found to be persistent and localized at the apex, tuberculosis is to be thought of; and if there is anything in the general condition, such as a sensation of fatigue or loss of flesh, immediate treatment should be instituted.

[Interrupted, or cog-wheel, inspiration is also an early sign. In a case recently observed a high, shrill, bronchial, inspiring sound, under the right clavicle at the end of deep breathing, was, with interrupted inspiration in lighter breathing, the earliest physical sign in a female aged 22.—J. C. W.]

According to Larcher, ²⁰⁰⁰ _{July, '95} the state of the thoracic resonance should be systematically studied not only in patients showing some evidence of pulmonary lesions, but especially in those in whom the stethoscope reveals no appreciable sign. By this means Fernet has been able to make a very early diagnosis, finding the resonance distinctly altered in one apex or the other,—a fairly certain sign of beginning tuberculosis. When the ear is applied to the interscapular region at the level of the second dorsal vertebra and

the anterior edge of the clavicles lightly percussed, a vibrating murmur may be perceived, somewhat metallic, consisting of the initial sound produced by the blow of the finger on the thoracic wall and the vibrations and waves of resonance which are the consequence, and which sometimes are sufficiently developed to cover the initial sound. These vibrations can only occur when the double dome formed by the bones of the thorax, closed in by the pleura, is healthy. A change in the resonance will take the form of a higher tonality, of less intensity, dull timbre, and dry. Larcher believes that, in difficult or doubtful cases in which the classical signs are abortive, resonance will aid in establishing a firm diagnosis and in instituting a rational treatment from the beginning.

Galliard ¹¹⁵³_{Oct. 19, '96} calls attention to the fact that, though the cracked-pot sound signifies practically a tuberculous cavity, this symptom is met with in several other affections of the thorax. In pneumonia, in fact, this sound may be produced either near the pneumonic centre or near an obstruction. The author also admits, with Woillez, that the special resonance may manifest itself at a distance—that is, below the clavicle—when the hepatization is situated at the base of the lung. In pleurisy this sound has been carefully described by Notta, and was distinctly mentioned by Landouzy in 1858. The author himself has had occasion to observe it several times. This symptom exists sometimes with the simple forcing back of the lung, sometimes with its vicarious dilatation, and sometimes where there is liquid or thick, false membranes below the clavicle.

[A cracked-pot sound may be observed in infants in whom there is no tuberculous disease of the lungs upon forcible percussion.—J. C. W.]

Hanot ³_{Oct. 9, '96} states that the earliest two signs of phthisis are the diminution and roughness of the vesicular murmur under the clavicle and the presence of Koch's bacillus in the sputum. They should both be sought for at the earliest moment.

Litten ⁶⁷³_{Mar., '95} described a new diaphragmatic phenomenon which he has observed and studied for some time and which he believes he is the first to report. It consists of a sort of undulating line extending from the vertebral column to the seventh rib and synchronous with the movements of the diaphragm. In a normal individual this line of movement of the diaphragm can be seen on the thoracic walls, the intensity of the inspiration and the limits of the diaphragm during inspiration and expiration being thus shown. Percussion is not necessary, therefore, since the upper point marks the upper margin of the liver in a state of rest and

the lower in deep inspiration. The phenomenon is of interest to the physiologist, aiding him in studying the movements of the diaphragm; and of greater interest to the pathologist, in determining whether abnormal conditions exist. In emphysema the line is lower and more limited. The normal movement of the diaphragm is seven centimetres, and in pleurisy with effusion it is much less. If the diaphragm is seen above the zone of dullness the case is one of subphrenic abscess; if below, it is one of pleuritic exudation.

The cause of the disparity found in both health and disease, on physical examination of the upper portion of the chest, is discussed by Charles Cary, of Buffalo. ⁵_{Oct., '96} The author states that, by comparing the arrangement of the bronchial tubes of the two lungs from below, the truly extra lobe on the right side is, as has been inferred by Aeby, the upper one, and that the upper lobe of the left lung is the homologue of the middle lobe of the right lung. It is pretty uniformly conceded that most of our physical signs are conveyed to the ear of the auscultator or to the hand of the examiner, in the case of fremitus, by vibrations of the air contained in the bronchial tubes. It, therefore, becomes very apparent that in health, or in like conditions of disease on the two sides of the chest, the right superior bronchus will, in most cases, intensify the vibrations, which will reach the ear or the hand of the examiner by a shorter route than must occur on the left side.

Falkner ³¹_{July 17, '96} states that acute miliary tuberculosis may follow its evolution without fever, but when generalized in the peritoneum and pleura it is necessarily accompanied by phenomena of inflammation that are clinically evident. The exudate may present all the characteristics of ascites and hydrothorax without pain, cough, or râles. The evolution of this form of the disease may go on without much affecting the general condition of the patient.

Boullaud, of Limoges, ⁸⁷⁴_{Dec. 22, '94} calls attention to a peculiar deformity of the posterior thoracic wall in cases of fibrous tuberculosis. It consists of an inclination of the scapula in such a way that the lower angle leans toward the axilla, while the spine, instead of being horizontal, inclines from above downward and from without inward. When this deformity is marked there is a projection of the axillary border of the thorax, produced by the throwing outward of the lower angle of the scapula. Atrophy of the trapezius seems to be the cause of this rocking movement of the scapula.

A case related by Köber ⁴_{No. 2, '96} shows that behind what appears to be a true form of vicarious menstruation there may lurk a latent tuberculosis. It is, of course, well known that many forms of

hæmorrhage from the respiratory passages are frequently attributed to vicarious menstruation even when they have no relation to the period of the onset of that function and graver disease is overlooked; and his observation points to still greater care being necessary when dealing with a case that appears to be genuine vicarious menstruation. The patient was 18 years old, had never suffered from any illness, and had menstruated regularly for two years. As the menses remained in abeyance on the last two occasions, being replaced by hæmorrhage from the lung, a definite relationship between them was suspected and a favorable prognosis entertained. Every care was, however, taken of the patient; but signs of an apical catarrh of the right lung began to show themselves and the case ended fatally, notwithstanding the fact that bacilli could not be found in the sputa.

A. J. Richardson, of the Sussex County Hospital, ⁶_{Nov. 24, '04} had under his care a case in which it was difficult to make a diagnosis during any stage of the illness, owing to the presence of jaundice and pyrexia with splenic enlargement. The resemblance to splenomegaly with hepatic cirrhosis, as described by Banti, ³_{v. 2, p. 364} was striking. At no time was there expectoration in which to make a search for bacilli.

In a paper on concealed tuberculosis, B. K. Rachford, of Cincinnati, ¹_{Aug. 10, '05} enumerates the following points as aiding in diagnosis: Family history of tuberculosis; history of exposure to tuberculous contagion; pronounced anæmia without apparent cause; irregularity and early appearance of the menstrual function; scanty and pale menstrual flow, followed by a leucorrhœal discharge; dyspnœa and pain in the side on slight exercise; proneness to catch cold; abnormal dwarfishness; progressive failure of health; neurotic disease; dyspepsia; enlargement of external lymphatics. The early diagnosis of glandular tuberculosis in children is important for two reasons: (1) it is curable; (2) when entirely recovered from it affords partial protection against pulmonary tuberculosis later in life.

The only reliable method of examining sputum for tubercular infection, according to W. G. Bissell, of Buffalo, ¹⁷⁰_{Oct., '95} is to select the portion to be mounted in such a manner as to be sure that if the organism is contained in the sample it will be revealed in the mount. This, the author states, can be accomplished in the following way: "As soon as the sample of sputum is received, add to the sample about an equal volume of a 3-per-cent. solution of sodium hydrate, shake well the mixture, and place aside to allow sedimentation. After a few hours draw from bottom of the bottle, by means of a pipette, what sediment may be present, and

centrifugate this sediment for about three minutes. If the bacillus tuberculosis be contained in the mixture, on centrifugation it will go to the bottom and will invariably be present in the first mount from the bottom of the tube."

Spengler⁶⁹_{No. 15, '95}; ²_{Aug. 10} describes a new method for the preparation of sputum which it is desired to investigate for the presence of tubercle bacilli. Equal volumes of sputum and of warm water rendered feebly alkaline with caustic soda are well mixed with 0.1 to 1.0 per cent. of trypsin and placed in the incubator. Putrefaction is prevented by the addition, two or three hours later, of a small quantity of crystalline carbolic acid. As soon as a deposit has formed the supernatant fluid is poured off and the deposit washed with fresh alkaline water and again placed in the incubator. This process is repeated several times, and finally the sediment is collected upon a filter-paper and dried somewhat. Portions are then stained in the usual way. As a rule, in twelve to twenty-four hours so little sediment remains that only a few microscopical slides are needed. If the digestion of the sputum be not carried on for too long a time, the tubercle bacilli undergo no modification in their staining properties. R. Paulus²¹⁴_{Apr. 15, '95} considers this method as simpler and surer than the analogous methods of Biedert, Dahmen, von Ketel, Mühlhäuser, and Stroschein.

Eugene Hodenpyl, of Brooklyn,¹⁵⁷_{July, '95} makes a plea for a more careful and systematic examination of sputum for the detection of the bacillus tuberculosis in cases of suspected phthisis. Difficulty is frequently experienced in detecting bacilli or fibres owing to the sparse numbers in which either may be present. Recognizing these drawbacks to diagnosis, T. G. Ashton and A. H. Stewart, of Philadelphia,⁹_{Oct. 6, '94} have utilized a modification of the hæmatokrit of Blitz-Kedin, the calibre of the glass tube in which the precipitation is to take place being two and a half millimetres in diameter and in length about fifty millimetres.

[The work of Ashton and Stewart, in my clinic at the Jefferson Hospital, has yielded most satisfactory results in cases of incipient pulmonary tuberculosis with obscure signs and scanty expectoration.—J. C. W.]

Of the various methods employed for staining tubercle bacilli in sputum Benysek⁹⁵³_{B. 40, p. 481}; ⁸¹⁴_{Nov. 1, '95} recommends the following: The sputum to be examined is evenly divided and pressed between two sterilized object-glasses, and then exposed to the air, preferably under a bell-jar, to dry. All heat is to be avoided, as the stains then become less distinct. The dry sputum is now moistened with a mixture composed of a concentrated alcoholic solution of fuchsin, 4 parts; carbolic acid, 5 parts, and water, 45 parts, and

gently warmed over a spirit-lamp until vapors rise. It is then washed with water and stained with a solution of methylene-blue to which 10 per cent. of sulphuric acid is added. After four to six minutes it is again washed with water and finally dried. The tubercle bacilli acquire a dark-red color, while the rest of the specimen is colored light blue. Other bacteria are not stained by this procedure. Very good results are also said to be obtained by staining with an alkaline solution of methylene-blue and malachite-green; but this is a slower process than the above.

C. W. Ingraham, of Binghampton, N. Y., ⁵⁹_{May 4, '95} claims that no physician should decide that a lung disease is non-tubercular until he has before him a complete record of the patient's temperature showing no recurring daily elevation for a period of two weeks.

An elevation of one-half degree, occurring daily at some time during the afternoon or evening (even though it remain elevated for only a short time) for a period of two weeks, should cause a strong suspicion of tuberculosis, even though it be the only indication; and if associated with concurrent objective symptoms, even though there be no distinct physical signs, a diagnosis of incipient tuberculosis can be made with a fair degree of certainty. If the record, taken at 9 and 11 A.M. and 2, 4, 6, and 8 P.M., show a daily elevation of one degree during a similar period, a positive diagnosis of pulmonary tuberculosis (other diseases excluded) is justifiable, and will, in 90 per cent. of cases, be confirmed by microscopical examination at a later period. By requiring a temperature record for a period of two weeks all liabilities of accidental elevation are eliminated, and the patient should be instructed not to carry his exercise or occupation to the extent of physical fatigue during the "temperature test."

The importance of frequent observations of temperature in the diagnosis of chronic tuberculosis is also emphasized by Walter Channing, of Brookline, Mass. ⁹⁹_{Dec. 19, '96} In the discussion of this paper R. H. Fitz stated that, according to the quantity and quality of the bacteria and the frequency with which they or their products are admitted into the circulation, the range of temperature will vary and irregularities in the course of the fever arise, as the tuberculosis is limited to the brain, lungs, intestines, kidneys, or elsewhere in the body. It is to be remembered, however, that the elevated temperature in tuberculosis is always atypical. Febrile temperature is not at all times present, even in pulmonary tuberculosis; it may be absent for weeks in peritoneal tuberculosis, for months in articular tuberculosis, and for years in glandular and in cerebral tuberculosis, although a fresh bacillary invasion from the cheesy foci may rapidly prove fatal. F. C. Shattuck said that in

the inflammation of serous membranes, non-tubercular as well as tubercular, there is no definite relation between the lesions and the temperature. In peritoneal tuberculosis the temperature may be even subnormal continuously for considerable periods. We think of fever as an almost necessary accompaniment of pulmonary tuberculosis at some time or other. He recalled two cases of chronic phthisis in which he had good reason to believe that fever had been practically absent for years. He has used tuberculin injections for diagnostic purposes in some six cases; but naturally the number of cases to which this test is applicable is not very large, though the results thus far seem to be satisfactory and encourage him to believe that the test is of real value.

Martinez Vargas ³_{Aug. 22, '95} states that, among the different manifestations of tuberculosis in children, the high temperature, by its irregular progress and intermittent form, often leads to the disease being mistaken for malaria, especially when the tuberculous foci cannot be discovered or have not yet caused symptoms revealing their existence. In spite of this uncertainty the thermometric curve presents a significant characteristic,—that of falling below normal at various periods of the day. This is not a transitory hypothermia, as in influenza or the terminal period of certain febrile diseases, but persists for days and even weeks.

Hazle Padgett, of Columbia, Tenn., ¹²⁰_{Aug., '95} has studied the slight temperature rise in early tuberculosis, watching carefully its variation and temporary cessations to begin again; so long that if he see a patient exhibiting a daily rise of temperature of from a little under one degree or a fraction above, and showing this rise regularly for seven or eight weeks, he makes a diagnosis of tuberculosis (it may not be of the lungs, of course), after having eliminated all other sources.

[The importance of an occasional inverse temperature is not to be overlooked.—J. C. W.]

Prognosis.—Albert Robin, of Paris, ³⁶⁰_{Apr., '95} concludes, after a study of the indications furnished by the proportion of urinary solids excreted, that any case of phthisis in which the average reaches 30 grammes (1 ounce) may be looked upon, with certain exceptions, as having arrived at the cachectic stage, so far as nutrition is concerned. Cases improving under treatment excrete more solids in the urine if the weight is stationary or less solids if there is increase in weight, provided fever, diarrhœa, or appreciable night-sweats are absent. In cases which become worse a steady diminution in the solids without any increase in weight stands in relation with an aggravation of the malady. The supervention of generalized tuberculosis, pneumonia, etc., causes a diminution, and

such a sudden diminution should draw attention to the appearance of these complications.

Andreesen, of Ialta, Crimea, ³⁵_{June 8, '96} regards the intense red border on the gums, pointed out by Frederic Thomson, as of grave prognostic importance. It appears and increases when the disease is acute or is making rapid progress, while it is absent in mild cases or those of slow evolution. Of 139 actual or suspected tuberculous patients examined from that point of view the red border existed in 92, of whom 69 were actually tuberculous and 23 suspected. Tuberculous patients in whom the red border was absent soon improved. When fever appeared the redness became more vivid.

Courmont and Denis, of Lyons, ³_{Nov. 3, '94} made some experiments upon rabbits by inoculating them under the skin with the sputum of tuberculous patients whose general health seemed unaffected by the disease and also with that of a case of the rapid type. From these experiments they conclude that when such inoculations do not cause the disease in a rabbit the case is of an attenuated, benign, and scrofulous form, comparable to ordinary surgical tuberculosis, and a favorable experimental prognosis is warranted.

Predisposing Conditions and Habits.—Trousseau, Grisolle, and others have called attention to a form of polyuria which at the end of a certain time leads to tuberculosis. David ²⁰⁰⁰_{'96} distinguishes another form, marking the first invasion of the organism by the Koch bacillus, and which was pointed out for the first time by A. Robin, in 1894, as being the true tuberculous polyuria. From the few cases thus far reported it appears that pretuberculous polyuria is met with only in men, and between the ages of 20 and 30 years, the nervous temperament being the most predisposed. Fever, prostration, and sometimes violent lumbar pains mark the ordinarily sudden onset of the disease, but these acute symptoms disappear at the end of a few days, at the same time that polyuria becomes established.

[The term "pretubercular polyuria" is a misnomer and is misleading. If the polyuria be due to tuberculous processes, it is "tuberculous," not "pretuberculous."—J. C. W.]

Teissier, of Lyons, ⁹⁹⁶_{Feb. 10, '96} has observed a certain number of cases in which the appearance of albumin in the urine preceded the symptoms of pulmonary tuberculosis. This albuminuria was intermittent, with a regular cycle, generally occurring in the morning, and associated with phosphaturia. It alternated with attacks of pulmonary congestion and disappeared when the tuberculosis was definitely localized.

Potain ¹⁴_{Dec. 5, '94} calls attention to the frequency of phthisis in

elderly men, in whom the association of emphysema and bronchial catarrh may modify the usual symptoms of the disease. Dyspnoea and dilatation of the right heart are present, but the chief symptom is lack of nutrition. The digestive functions are diminished, appetite and assimilation are both poor, and there is no resistance of the system to the invasion of the disease. Fever and hæmoptysis are rarely observed. The differential diagnosis must usually be made with chronic bronchial catarrh and bronchiectasis.

Michel²⁰⁰⁰₉₄ has also studied this subject, and, from an examination of the urine, finds that the disturbed nutrition is characterized by a diminution and slackening of organic exchange and oxidation.

[It is not alone in the elderly that a substantive or a compensating emphysema may mask the signs of pulmonary tuberculosis. I have seen several cases in young adults in which well-marked bilateral emphysema has obscured the signs of tuberculosis, as shown by rapid failure of health, loss of weight, blood-spitting, and the presence of tubercle bacilli in the sputa. —J. C. W.]

Ernest Barié⁹²_{Oct., '95} ¹⁵_{Feb., '96} states that during the decennial period, 1884 to 1893, 2202 old persons died of pulmonary tuberculosis out of a total of 92,141 deaths between the ages of 60 and 90 years, in the various hospitals in Paris. The characteristics of senile tuberculosis depend not so much on the initial lesion as on the course of the disease. Tuberculosis of the lung attacks the aged in the same way that it attacks those in earlier life, but in old persons certain secondary changes are commonly found which influence the clinical evolution of the disease. Among these lesions bronchitis, emphysema, and sclerosis (fibrosis) are the most notable. Barié shows that in a large number of cases senile tuberculosis is a lighting-up afresh of a pre-existing tuberculosis which, after producing symptoms in earlier life, became quiescent and was apparently cured. On the other hand, tuberculosis may attack the lung for the first time in advanced life. Such cases constitute true senile phthisis. Generally speaking, the causes of tuberculosis in old persons are the same as those in the adult. Heredity is mentioned as one cause, but insufficiency of air, of exercise, and of nourishment, with poverty and alcoholism, are more important.

According to Lancereaux,¹⁰_{Mar. 5, '95} ²²_{Mar. 13} the influence of alcoholism on phthisis is incontestable. Alcohol and essences, in diminishing organic combustion and in being eliminated by the lungs, create a general and local predisposition which furnishes to the bacillus of tuberculosis a field favorable to its development. Mon-

nier, of Nantes, ¹²⁷_{Nov. 12, '95} from a close study of this question, has, like Lancereaux, come to the conclusion that the closest relations exist between alcoholism and tuberculosis. He has ascertained that alcoholic phthisis usually begins by preference in the posterior portion of the right apex, while ordinary phthisis begins on the anterior portion of the left apex. The progress is usually rapid. The patient, although severely affected by the disease, may apparently have a robust constitution and a healthy-looking face,—at least, the wine-drinker, who presents a strong contrast to the brandy-drinker, with his pale face and anxious expression. Monnier points out the hopeless evolution of alcoholic cases as compared with the ordinary tendency of phthisis toward recovery in cases without taint or debility. He believes that alcoholism gives as dark a tinge to the prognosis of tuberculosis in adults as does heredity to the tuberculosis of adolescents.

Plicque ¹¹⁵³_{Jan. 5, '96} notes a relation between certain diets and tuberculosis. He cites two cases, the first eczematous and 25 years of age, whose father died of tuberculosis, and the second an obese patient 19 years old. To both of these a special diet was prescribed, insufficient and debilitating, and which, followed somewhat to excess, led to incipient tuberculosis. Therapeutic inanition had favored infection by the bacillus. He therefore recommends that prudence be exercised in prescribing a diet in cases in which there is the least hereditary or personal taint, particularly in young patients with obesity or dyspepsia.

Treatment. Serum Therapy.—Paul Paquin, of St. Louis, ⁶¹_{June 15, '96} holds that horse-blood serum may be rendered more antagonistic to tuberculosis than it naturally is by repeated immunization. He treated a number of cases with serum prepared according to his method. An increase of weight was noted; the cough, expectoration, and night-sweats were reduced, and the appetite increased. The dose of serum injected was at first 10 drops, but this was gradually increased by 10 drops until in some cases over 1 drachm (4 grammes) was injected at a dose. In but 2 cases out of 20 were diminutive abscesses caused.

At a meeting of the St. Louis Medical Society F. J. Lutz ⁸²_{June 29, '96} presented a specimen, removed post-mortem, from a case which had been treated by the Paquin serum and in which the lung-capacity had been markedly increased.

The point of particular interest was the condition of the cavity in the left lung, which was the only one that had been diagnosticated during life. The cavity was perfectly clean; it contained no secretion at the time of the post-mortem, and the surface was smooth and lined by a distinct membrane which shows no

points of ulceration whatever. Paquin, in the discussion, stated that this "drying up" of existing cavities had been observed in five cases after a period of interrupted treatment extending over two, three, and four months. The longest period of treatment was two months. In one case, in which there existed a cavity of considerable size, there was abundant muco-purulent expectoration, amounting to one pint daily, which disappeared entirely after the treatment had been continued for some time. Of 4 other cases under treatment at the time, and who have been under treatment for four, six, and eight weeks, respectively, 2 have two cavities, one in either lung, and the other 2 have but one cavity. In all 4 the expectoration has been reduced to such an extent that there was barely sufficient to make a microscopical analysis.

[This condition would seem to correspond with the first stage in the local resolution following injections of Koch's tuberculin, as shown in the two autopsies reported by Coghill and Adami, and given on page A-36.]

Of the limited number of cases treated so far, the twenty-five described by L. L. Shropshire, of San Antonio, Texas, ^{Jan. 4, '96} would seem to be the most interesting. All were improved, some very materially, but the climate of the locality must, of course, come in for a share in the results attained. In some of the cases improvement only began to show itself at the end of ten weeks. J. R. Lemen, of St. Louis, ^{Sept. 21, '95} treated a case of acute tuberculosis with Paquin's serum. The treatment was commenced on April 22d, 30 drops being injected; the temperature at this time was 102.5° F. (39.2° C.). On April 23d another injection was given, the temperature falling to 100° F. (37.8° C.). The treatment being then continued, the temperature became normal on the fourth day of treatment, the cough improved, and the patient slept much better and has continued to improve. After taking serum for two weeks, however, there was a slight, painful swelling of the left ankle, which was supposed to be due to the serum. This continued for two weeks and then disappeared. On May 10th the temperature rose daily to 100.5° F. (38.1° C.) for three days, and then became normal; this rise was ascribed to serum. The appetite has been good since improvement began, and the patient has gained flesh, weighing at this time 180 pounds (82 kilogrammes),—a gain of about 40 pounds (18 kilogrammes). On July 1st a specimen of sputum was given to Ravold, of the city board of health, who reported no bacilli. Again, on July 7th and July 12th, specimens were examined by the same authority and no bacilli were found.

Experiments in guinea-pigs by von Ruck, of Asheville, N. C., ⁵⁰May 25, '95 and S. W. Hewetson, of Saranac Lake, ¹Nov. 9, '95 would

seem to justify the conclusion that Paquin's antitubercle serum has no influence in prolonging the life of guinea-pigs.

C. H. Ingraham, of Binghampton, N. Y., ⁶¹May 4, '96 tried injections of the simple primary serum from the blood of the mule. Although the injections were administered for a sufficient length of time for them to manifest any curative properties, Ingraham states that he is obliged to record that he did not in any individual case see an improvement that would warrant a continuation of the treatment.

Redon and Chenot ⁹²⁷June 29, '96 have made numerous experiments with the serum of mules and asses that had been inoculated with human tuberculous products. These animals support such inoculations well, in increasing doses of increasing virulence. The natural serum has but a feeble preventive action against the tuberculous virus in the guinea-pig and rabbits, but this effect is much more marked after the animals have been submitted to injections of tannin and then to small doses of tuberculous emulsion of great virulence. The antituberculous action of the serum is then re-enforced by an antiseptic action capable of arresting the development of agents of putrefaction and suppuration.

Boinet, of Marseilles, ⁹²⁷July 6, '96 reported 8 cases treated with immunized goat-serum. In 3, in the first stage, improvement was very remarkable. In 2, in the second stage, presenting yet more dry, crackling sounds than moist râles, the result was also good. But in the other 3, presenting cavities, no betterment at all was ever noticed. Boinet states, again, that in slow, torpid cases without fever the serum does good, but it is injurious in acute forms with fever, bleeding, sweats, and laryngeal complications.

E. Maragliano, of Genoa, ¹⁸⁸Aug. 18, '96 after three years of investigation, succeeded in preparing a serum obtained from dogs, asses, and horses by special procedures. Discarding cultures of living bacilli, he availed himself exclusively of the highly-toxic principles extracted from them. By progressive vaccinations dogs were immunized against intra-venous injections of very active tuberculous matter taken from the human subject. As the result of experiments to determine the potency of this serum, he found that, on injecting tuberculin together with a sufficient quantity of the serum into a tuberculous subject, no reaction, either general or local, takes place, whereas the same quantity of tuberculin injected alone produces both general and local reactions. Maragliano considers that the capacity of a serum to neutralize the toxic effect of tuberculin is the best gauge of the therapeutic potency of an antituberculous serum. He has tried the serum clinically in eighty-two cases, including all forms of pulmonary tuberculosis, from the gravest to the slightest, and has arrived at the following

conclusions: 1. Cases with circumscribed foci of disease, with little or no fever and free from the association of active microbes, show marked improvement. Forty-five such cases have been treated, and of these all who have undergone methodical and complete treatment (29 cases) could be considered as cured. The remaining 16 cases, some of which were febrile, improved considerably, but have not completed the treatment. 2. Cases of tuberculous broncho-pneumonia, with diffuse centres of disease, febrile or apyretic, but with few associated microbes, give hopes of cure if the treatment is persevered with. Fourteen such cases have all improved under treatment. 3. Diffuse broncho-pneumonias, with considerable association of microbes, show less marked improvement. Fourteen cases have been under treatment, and their condition has remained almost stationary. 4. Destructive broncho-pneumonias, with cavities, show only slight improvement from treatment. Out of 9 cases, 3 febrile cases improved considerably for the time, becoming free from fever and gaining weight. One of these, having given up the treatment, died a year later and 1 is still under treatment. Of the other cases 4 remain stationary and 2 died. Maragliano states that the treatment must be continued long enough to bring about a cure, otherwise relapses are likely to occur, and that some cases have been two years under treatment. As to the mode of using the serum, he commences in apyretic cases with a dose of 1 cubic centimetre ($15\frac{1}{2}$ minims) every second day for ten days, then a similar dose every day for another ten days, then for the next ten days two similar injections a day. With slight fever the same procedure may be followed; but with high temperature an attempt should be made to control the fever by large doses, and 10 cubic centimetres ($2\frac{1}{2}$ fluidrachms) of serum may be injected at a single dose. The treatment should be continued for a month, at least, after the cure seems to be accomplished, and it may be advisable to continue with weekly injections of 1 cubic centimetre ($15\frac{1}{2}$ minims) for a year. Although satisfactory results are not to be expected in advanced cases, Maragliano recognizes no contra-indications to the employment of the serum; even in cases where it does no good it can do no harm.

The corroborative testimony published has been insufficient, the majority of the reports being limited to one or two cases and therefore presenting no value. Marucci, of Rome, ²_{Nov. 16, '95} records twelve cases which he divides into two groups: (1) those in which febrile reaction is marked and (2) those in which febrile reaction is not marked. In all cases the fever has markedly diminished or disappeared; cough and expectoration have decreased; appetite and well-being have supervened; weight is increasing. Florentine

physicians appear, however, to regard the treatment as of doubtful utility. Carlucci, of New York, ⁹⁹_{Dec. 5, '95} reported in detail three cases which seem to lend weight to Maragliano's observations.

[Semmola, of Naples, Italy's greatest clinician, may be said to have voiced the prevailing opinion of the majority of the profession regarding the actual position of sero-therapy when in an interview he spoke as follows: "An organism born of tuberculous parents is destined only to become a favorable culture-medium, within a more or less variable period of time, according to the numerous circumstances more or less favorable to its development; and during that period the organism, in virtue of a biochemical germ which is unknown to us, prepares itself by slow and invisible evolution for the period of receptivity, which may be called pre-tubercular, in which the bacillus invades and devours it. A good clinician is sometimes able to detect this period, especially in certain classes of society, and he is sometimes able, also, in certain happy instances, to drive away the future danger by producing a profound curative alteration in the economy through appropriate treatment. In what does this long preparation or, *vice versâ*, the natural immunity (which one might also call by a better name,—natural resistance) against invasion by the Koch bacillus consist? We do not know, and no laboratory nor biologist can enlighten us. What is certain, however, is that this resistance has not for its basis an artificial antituberculous toxin. To stimulate with serum therapy the metabolism of a phthysical patient and immunize him until the bacillus is temporarily destroyed is a small matter, if serum therapy cannot cause the destruction of the congenital germ and transform the organism into a culture-medium unfavorable to the bacillus. In consequence, without waiting for control cases, it is permissible to believe that the phthisis supposedly cured by serum therapy, simply because the body-weight has increased and fever and bacilli have disappeared, is, in reality, not cured, and that relapse is inevitable sooner or later; and any good clinician who wishes to prove the contrary should wait at least several years before publishing his triumphs to the world, in order not to abuse the credulity of patients. At the time of the illusions regarding Koch's tuberculin I knew hundreds of these poor patients who had received their certificate of cure from a complaisant director of some clinic and who within several months were all dead."]

Important in this connection was the communication of Maffucci and di Vestea, before the Tenth Congress of the Italian Surgical Society, ²_{Nov. 16, '95} to the effect that in the present state of the science it is not unreasonable to suppose that Behring's law will

eventually be applied also to the case of tuberculous infection, it being known that the high toxic power inherent in the protoplasm of the specific bacilli has a very important part in this infection. In the twofold condition created by the present knowledge on tuberculosis, of the almost impossible artificial immunization of susceptible animals, and not having in mammals a single species endowed with complete natural immunity, the most that can be done in our trials of serum therapy is to elevate it as highly as possible in the species least susceptible to the virus and the specific poison. William Catto, of Bath, ²_{Sept. 14, '95} expresses the opinion that we may expect a serum remedy, or prophylactic, for every disease in which one attack secures immunity,—such as small-pox, measles, scarlet fever, diphtheria, syphilis, snake-bite, etc. The essential facts of tuberculosis are, however, against the expectation of a serum remedy.

Tuberculin and Antiphthisin.—J. G. Sinclair Coghill, of Ventnor, ⁶_{Nov. 16, '95} had an opportunity of examining the post-mortem appearances of a case treated four years previously by Koch's method. Besides the vomicae resulting from the recent pathological process in the left lung, the right lung was found to contain a caseous nodule surrounded by a thick, fibrous capsule. The whole upper third of this lung was occupied by a cavity with an extremely thick, fibrous wall. The lining membrane had no pus on its wall,—indeed, it seemed almost dry; it communicated with a small bronchus. This vomica had been recognized in the original examination and referred to in the report as of older standing than the excavation in the left apex, and as also being in a condition of arrest. The bases of both lungs were much congested hypostatically, and contained a few capsulated, caseous nodules scattered throughout their substance. The heart was extremely small, anæmic, and its walls much thinned; the right side was dilated and full of blood. The valves were quite healthy. The author thinks that there can hardly be any hesitation in ascribing the arrest of this extensive area of acute pulmonary tuberculosis to judicious tuberculin inoculation. He holds that tuberculin has potent therapeutic efficacy in the treatment of tuberculosis when used judiciously and with caution in doses, and under conditions adapted to each individual case.

Adami, of Montreal, ²⁸²_{Oct. 26, '95} at the necropsy of a man who had been treated by Koch, in 1890, found adhesions at both apices. The latter showed well-marked fibroid changes and contained encapsulated, caseous masses and small, contracted cavities. In these parts the tuberculous process had evidently been arrested, but the rest of the lung-tissue contained numerous miliary tubercles

distributed along the course of sundry bronchi. The tubercles were most numerous in the neighborhood of the old trouble; they were surrounded by very little pneumonic alteration and were rather of the fibroid than the rapidly-advancing type. The second attack was thus not the result of fresh infection, but of the recrudescence of the old process starting from the incompletely healed disease foci. Their nature indicated either relative attenuation of the bacilli or increased resistance on the part of the tissues. The case evidently showed that a year's treatment by Koch's method had succeeded in arresting for four years an active and extensive tuberculous process in both lungs.

Klebs, of Zurich, ²¹³⁸/₉₆ regards as the most important constituent of tuberculin a substance which he calls "tuberculocidin," which is obtained from the tuberculin of Koch by precipitation with alcohol and further purification of the precipitate. In all of the stages of the disease the tuberculocidin exerted a beneficial influence. This was more marked in the earlier than in the later stages. He succeeded afterward by other methods of producing a tuberculin of a better character than that produced in the method of Koch, which he designates as "antiphthisin." Antiphthisin is very much like tuberculocidin, but, instead of being made from tuberculin, it is made directly from the ten-times concentrated culture-fluid of tubercle bacilli, the toxic principles which tuberculin contains being supposedly excluded. Its special value depends upon the fact that a larger dosage is allowable, without the injurious toxic effects to be expected from large doses of tuberculin. According to Klebs, antiphthisin is a sozalbumin which destroys tubercle bacilli in the test-glasses, and which in animal experiments confers a slight degree of immunity to tubercular infection. It causes resorption of tubercular tissue, and conversion of such to the forms of tissue from which it proliferated. Denison ¹⁵/_{Oct., '96} has had twenty-three cases under treatment with antiphthisin, and reports two of these at length, in both of which the improvement was considerable. The remedy may be administered per rectum or hypodermatically; and, though details of dosage are not given, we find one patient reaching 5 cubic centimetres (1½ fluidrachms) for a dose by the rectal method, and another getting up to 3 cubic centimetres (46 minims) hypodermatically. Although reaction effects, such as were constant with tuberculin, are occasionally produced, such an effect is uncommon. Like Maragliano's serum, antiphthisin produces an increased leucocytosis. Admitting the great aid of the climate and exercise enjoyed at Denver, Col., Denison considers that antiphthisin is a valuable remedy in consumption.

Von Ruck has had good results from its use in a number of cases²¹³⁵_{p.30,'94} and is an enthusiastic partisan of the remedy. He states, however,¹_{v.61, No.5, p.142,'95} that as it is a specific germicide we cannot expect it to control the conditions resulting from associated pathogenic germs of, for instance, the streptococcus pyocyanus, diplococcus, etc.; nor can we expect to remove with it the symptoms and degenerative processes indirectly due to them or to the tubercle bacillus. Under cautious procedure the beginning dose for an adult is 0.1 cubic centimetre ($1\frac{3}{4}$ minims) of the ten-times concentrated solution, and this dose is increased by 0.1 cubic centimetre ($1\frac{3}{4}$ minims) a day until 1 cubic centimetre ($15\frac{1}{2}$ minims) is reached. The latter may be repeated for several days, and the increase thereafter may be more rapid,—by 0.5 cubic centimetre ($7\frac{3}{4}$ minims) at a time, repeating each such dose three or four times, or even a week, according to the effect produced.

Among the favorable reports were those of A. C. Kinney, of Sunol, Cal.,⁷⁷_{Aug., '95} who considers it as also beneficial in the second stage, and H. Longstreet Taylor, of St. Paul, Minn.,¹¹⁷⁰_{Oct., '95} who states that he is convinced that tuberculin, or antiphthisin, is our most certain remedy for this disease, but not that it is or even can be so modified as to become a specific. Its careful use is not considered dangerous. In incipient cases its use should be encouraged, and in advanced ones without too pronounced sepsis it may be given a trial. His report is based on a total of 72 cases with a complete analysis of 39 cases.

Gabrilovitsch⁵⁸⁶_{No.6,'95} reports favorable results, but he in no way regards it as a specific in tuberculosis. Klebs, himself,⁵⁹_{May 25,'95} states that the remedy can only be effective in cases in which there are no secondary pathological products in the tissues.

E. L. Trudeau and E. R. Baldwin, of Saranac Lake,⁵⁹_{Dec.21,'95} after a chemical and experimental research, conclude that antiphthisin, prepared according to Kleb's published method, is, practically, highly-diluted tuberculin, and its physiological effect on animals, when given in sufficient doses, is the same as tuberculin, and, furthermore, that it possesses no germicidal power on the tubercle bacillus which can be demonstrated *in vitro*.

Since cultures of the tubercle bacillus become acid as they grow and, furthermore, since the addition, without heat, of a little alkali to a filtered culture-medium upon which bacilli have ceased to grow renders it again fit for the development of a second crop of germs so long as any nutriment remains, it may be inferred that the limitation of the growth of the tubercle bacillus in such a culture-medium is most likely due to the acidity induced in the medium rather than to any specific germicidal substance produced

therein. When applied to animals, neither tuberculocidin nor antiphthisin had any curative influence over the course of experimental tuberculosis in the guinea-pig.

Creasote.—W. Kington Fyffe, of London, ²_{Sept. 22, '94} made some experiments at Victoria Park Hospital with creasote, giving it in some cases as an inhalation, in some by the mouth, and in others in a creasote chamber in which the drug was heated until the air was saturated with the vapor. The inhalations proved to have no effect on the bacilli. Doses of 2 to 12 minims (0.13 to 0.78 cubic centimetre) daily by the mouth caused a greater or less diminution in virulence, according to the size of the dose. Control animals lived longer after inoculation with sputum from the patient treated in the creasote chamber than by any other method, though the number of cases was too small to justify definite conclusions.

J. W. Chisholm, of New Concord, O., ²³³_{July 22, '95} obtains the best results in phthisis, with the least degree of constitutional disturbance, from inhalations of creasote, using a muriate-ammonia inhaler. In this he places 1 fluidounce (31 cubic centimetres) each of commercial hydrochloric acid and sulphuric acid, which have been carefully mixed in a glass mortar, and drops into it from 20 to 30 drops of a solution of beech-wood creasote, containing 1 fluidrachm (4 cubic centimetres) in 4 fluidrachms (16 cubic centimetres) of alcohol. The inhalations are given several times during the twenty-four hours.

The treatment of fetid expectoration, especially when occurring in bronchiectasis, has hitherto been extremely unsatisfactory. Arnold Chaplin, of London, ²_{June 22, '95} reports seven cases treated by means of his method, which consists in submitting the patient, in a small room made as air-tight as possible, to the fumes of the vapor of coal-tar creasote. The inhalation at first lasts half an hour, and later is increased to an hour or an hour and a half. The vapor is penetrating and capable of reaching the dilated bronchus; it is irritating and, by inducing cough, causes expulsion of the retained and decomposed matter; and it is antiseptic and does something toward rendering the bronchiectasis free from the putrefactive germs which cause the fœtor. Under the influence of the vapor the patient coughs up a large quantity of phlegm even when the tubes are supposed to be empty. This residual phlegm is horribly foul, and continues to be expelled during the sitting. At the first two or three sittings the phlegm is profuse and fetid, but subsequently it becomes smaller in amount and less foul, until after one to four weeks the odor has nearly disappeared and the amount expectorated is only trifling in amount. At the

end of the treatment the amount of expectoration sinks almost to zero and the fœtor quite disappears.

Blanc²⁰⁰⁰₉₅ finds that suppositories containing 0.30 to 0.50 gramme ($4\frac{1}{2}$ to $7\frac{3}{4}$ minims) of creasote are well borne, that absorption is rapid, and that the improvement following their use is marked. Another method of using the drug per rectum is described by Jules Simon, of Paris, ³⁵_{Jan. 26, '95} the following solution being employed for every 10 kilogrammes (22 pounds) of the patient's weight:—

R Pure beech-wood creasote, . . . 0.0005 gramme ($\frac{1}{150}$ grain).
 Salol, 0.4000 gramme (6 grains).
 Iodoform, 0.4000 gramme (6 grains).
 Dissolve in pure olive-oil, q. s. for 10 cubic centimetres ($2\frac{1}{2}$ fluidrachms).
 Sig.: For one daily rectal injection.

The solution is warmed over a vapor-bath and introduced by means of a soft-rubber catheter, clean and well oiled, attached to a glass syringe holding about 4 drachms (16 cubic centimetres). The dose of creasote here used is proportionate to the patient's weight, while the volume of the vehicle is much reduced.

Annequin²¹²_{July 10, '95} regards rectal injections as the most satisfactory method of administering creasote in tuberculosis, and for three years he has employed no other method. He uses, in his hospital work, 20, 40, or 60 grammes (5, 10, or 15 fluidrachms) of a 1 to 20 solution in milk and adds sufficient boiled water to make 250 grammes (8 fluidounces). In private practice he advises a 1 to 30 solution, 2 tablespoonfuls being used when an injection of 1 gramme ($15\frac{1}{2}$ minims) of creasote is desired; or the creasote may be dropped directly into the milk, 43 drops (constituting 1 gramme) being placed in one-quarter of a glass of milk and the glass then filled with water.

John R. Conway, of New York, ¹_{June 1, '95} looks upon creasote as almost a specific in tuberculosis, after having employed it in nearly four hundred cases. He has had no difficulty in administering 20-minim (1.3 grammes) doses to patients who had previously suffered from intense gastric irritation, with vomiting and indigestion. He prescribes the drug in capsules mixed with codliver-oil in the proportion of 1 to 2. He gives the drug immediately after eating, and never on an empty stomach, taking care to use an absolutely pure drug. He begins with 2-minim (0.13 gramme) doses after each meal, and gradually increases the dose very carefully till a 20-minim (1.3 grammes) dose has been reached. He has used this dose for four or five months at a time without any unpleasant symptoms to the patient.

According to Louis Fischer, of New York, ¹_{Aug. 17, '95} by the introduc-

tion of creasote carbonate as a substitute of the crude drug, von Heyden placed at the disposal of the profession a non-irritant, non-poisonous preparation containing 92 per cent. of the purest creasote from beech-wood tar, chemically combined with 8 per cent. of carbonic acid, borne well in large doses by the most delicate stomachs. It has made it possible to employ the drug in sufficiently large doses, so that the results obtained have been very good. To prove the elimination of the drug, not only the breath gives ample evidence of it, but also the dark color of the urine shows that the drug has been absorbed and excreted.

The author emphasizes the importance, by several cases mentioned, of making a correct clinical and bacteriological diagnosis; of determining the patient's weight, allowing for physiological increase; and, in giving the drug, of increasing the dose after an interval of a few days. He has seen the best results from the administration of creasote carbonate after meals. An examination of the blood of patients during the course of the treatment has shown that the percentage of hæmoglobin is very materially increased, and that the relative proportion of the red and white blood-corpuscles is considerably increased in favor of the red corpuscles.

R. Seifert,⁴¹_{No.4,'95} recommends creasote carbonate as a substitute for creasote, in capsules of 15 to 45 minims (1 to 3 grammes). It is more slowly absorbed and, therefore, a more continuous and milder effect can be produced by its use.

Guaiacol.—Courmont and Nicolas³⁰⁴_{Feb.16,'95} have continued the study of the effect of external applications of guaiacol in tuberculosis,—a method utilized since 1893 by various authors, among whom may be mentioned Sciolla, Devoto, Maragliano, Bard, Lépine, and Courmont. (See previous ANNUALS.) The last-named author, who had previously established the fact that the antithermic action of the drug in no way influenced tuberculous cavities, that it possibly improved sclerosis, and that its best results were observed in limited miliary tuberculosis in which the diagnosis was doubtful. He now, in conjunction with Nicolas, announces that guaiacol, in doses sufficient to penetrate the human organism, has no direct effect on the evolution of tuberculous lesions in guinea-pigs, even after repeated applications. The improvement or recovery obtained in certain cases, especially of miliary tuberculosis, is, therefore, not due to specific action of the guaiacol absorbed, nor to the immediate (though temporary) reduction of temperature; but it is no doubt to be explained by the definitive regulation of the heat-curve, which becomes normal after a few applications of the drug, thus enabling the human organism to

successfully combat the bacilli by means of its usual weapons of defense.

Bugnion and Berdez,¹⁹⁷
Mar. 20, '95 arrive at very similar conclusions from experiments on rabbits, and think that, possibly, the good results observed are due to oxidation of the coagulable toxalbumins.

Bosc, of Lyons,²¹¹
Nov. 18, '94 describes a case in which apparent recovery followed the use of guaiacol applications in a woman aged 33 years. A case of miliary tuberculosis in a girl of 17 years was also reported as cured by de Cérenville.¹⁰⁸
May 15, '95 In a case described by N. E. Woessure, of Huron, O.,²³³
Nov. 12, '95 the drug acted as an analgesic when applied over painful areas.

De Renzi,⁵⁹⁶
Nov., '94 tried this treatment in 8 cases, 7 of whom were affected with tuberculosis and 1 with amyotrophic lateral sclerosis. His experience leads him to assert that applications of guaiacol have a more injurious than beneficial action on the organism. The temperature was lowered, but the general condition was not improved; in fact, the emaciation increased; the thoracic symptoms became aggravated, as shown by examination of the respiratory capacity; while marked metabolic changes were observed, such as diminished oxidation, destruction of red corpuscles, etc.

The internal administration of guaiacol was considered, in the course of some remarks on the treatment of 200 cases in the out-patient department of the Boston City Hospital, by G. G. Sears.⁹⁹
Apr. 4, '95 The author stated that the routine treatment, when the prognosis was not absolutely fatal, consisted in the administration of guaiacol (occasionally creasote) in doses rarely exceeding 5 minims (0.32 cubic centimetre) three times a day, together with arsenic and digitaline. In a few cases the dose of guaiacol was gradually increased to 15 or 20 drops, but no advantage could be seen in the larger amount. Except in one or two cases, where it excited some digestive disturbance which disappeared with a reduction in the dose, patients took it without trouble, almost the only complaint ever made being of the somewhat acrid taste and the persistent odor of the breath, of which they were themselves very conscious. The most marked effects for good were seen in the improvement in the general well-being of the patient, and were shown by a gain in appetite and weight and a decrease in the cough, even in many where the physical signs remained stationary or even seemed to be advancing. In a few cases cure was obtained, as shown by the disappearance of all signs and symptoms. Vickery, in the discussion of the paper, recommended the following formula employed by him and similar to that used by Fraentzel:—

R Creasoti fagi, 24 drops.
Tr. gentian. comp., 1 fluidounce (31 cubic centimetres).
Spts. vini rectificati, $\frac{1}{2}$ fluidounce (16 cubic centimetres).
Syr. sarsaparil. comp., 1 fluidounce (31 cubic centimetres).
Vini Xerici, q. s. ad 4 fluidounces (125 cubic centimetres).
M. Sig. : One teaspoonful in water before meals.

R. G. Curtin, of Philadelphia, ¹¹²_{Oct., '94} found guaiacol beneficial in chronic ulceration of the lungs, whether associated with the tubercle bacillus or not. He is satisfied that it has no specific action on the latter bacillus. He has had ample opportunity to observe the action of the drug in influenzal phthisis, and found the improvement following its use to be the same as in the tubercular cases. The best results were obtained in patients in whom the destructive process was slow and the symptoms mild. In his hands the action of guaiacol appeared to be more reliable than that of creasote.

Le Tanneur ¹⁴_{Feb. 17, '96} has for three years used subcutaneous injections of a solution of guaiacol in sterilized oil. His method differs from that of Burlureaux in that he uses guaiacol, the really active principle of creasote, instead of creasote itself. At the same time he employs a much weaker solution than in the method proposed by Weil and Diamantberger, having found that the larger doses gave rise to a febrile reaction, while the injections were also more painful. He begins by injecting 1 cubic centimetre (15½ minims) every two, then every three, days, according to the sensitiveness of the patient. He finds that it is rarely necessary to exceed this dose, which gives him satisfactory results. He notes a number of cases in which there has been no manifestation of tuberculosis for more than a year and in which the disease appears to have been arrested. The diagnosis was made by other physicians besides himself. Of fifteen cases in his private practice in which the diagnosis was made after consultation with another physician, all were in good health at the time of report, having neither cough, expectoration, nor night-sweats. From the beginning of the treatment there is always a marked return of strength and a diminution of cough; the sweating ceases, the expectoration diminishes, and appetite soon after returns. Ordinarily, after the fifth or sixth injection the patient begins to gain in strength and body-weight, and continues to do so if he follow out the treatment until the health is re-established.

Hölscher ⁴_{Dec. 4, '94} finds guaiacol carbonate milder in its action than pure guaiacol or creasote, the amount absorbed into the blood being small. He usually gives from 2 to 3 grammes (31 to 46 minims) daily, but gradually increases to 6 grammes (1½ fluidrachms) if necessary, and has obtained striking results. F. C.

Coley ¹⁶_{Jan., '95} and Torstenssen ⁶⁷³_{Apr., '96} have also had good results from this form of guaiacol.

Turchet ²¹²_{July 10, '96} finds milk an excellent excipient for guaiacol when it is desired to give rectal injections of this drug in phthisis. A solution of 1 part of guaiacol to 20 or 30 parts of milk will keep indefinitely without coagulating and can be readily mixed with water when it is desired to make the injection; or, if it be deemed preferable to add the guaiacol to the milk at the moment it is to be used, it need only be remembered that 1 gramme of the drug contains 38 drops.

Guaiacol and Menthol.—Rosenberg's method of large medicinal injections through the larynx formed the subject of a paper by Colin Campbell ⁶_{v.2,p.1279, '94} presented to the Royal Medical and Chirurgical Society. The solution employed by Rosenberg and Grainger Stewart was composed of guaiacol (2 per cent.), menthol (10 per cent.), and olive-oil (88 per cent.). The author had employed menthol in glycerin, but added a caution against the use of ordinary glycerin, which irritated the bronchial tubes, and advised the use of the pure kinds. These, being possessed of considerable expectorant properties, were a better medium than olive-oil. He had employed other drugs with a view of exerting a direct antiseptic action on the laryngeal, bronchial, and pulmonary tissue. In cases of hæmoptysis he had used turpentine in olive-oil; 1 to 1½ fluidrachms (4 to 6 cubic centimetres) was the quantity injected by a specially-modified syringe. The injection was made rapidly during inspiration, and might be performed twice, or even more frequently, at the same sitting.

J. K. Fowler, in the discussion, stated that he had successfully employed the method. Two drachms (8 cubic centimetres) of the antiseptic fluid could be injected through the glottis without any discomfort to the patient. If the injection were made on to the vocal cords, coughing resulted; but this could be avoided by passing the nozzle of the syringe through the rima glottidis and then driving the contents into the trachea. He had used the solution of guaiacol, menthol, and olive-oil employed by Rosenberg and Grainger Stewart, in doses of 1 drachm (4 cubic centimetres) twice a day, in order to diminish the amount of expectoration and remove fœtor. Campbell laid stress on the importance of passing the syringe rapidly through the glottis and, by thus surprising the larynx, obviating its irritability. An effort should be made to direct the fluid to the affected part by making the patient lie on that side after the injection.

Frederic C. Coley ¹⁵_{Oct., '94} states that the dyspnœa is often relieved in a striking manner by intra-laryngeal injections of menthol (20

per cent.), with guaiacol (3 per cent.), dissolved in olive-oil. "Use a syringe holding 1 fluidrachm (4 grammes),—the largest quantity that can be injected at one sitting. Guide the point of the syringe into the upper part of the larynx by the aid of a laryngoscope. It is not necessary to insert it between the vocal cords, only past the epiglottis. Inject from 20 minims to $\frac{1}{2}$ fluidrachm (1.3 to 2 grammes) at once, repeating after a pause of two or three minutes. If the patient has any tendency to cough he should be told to repress it; usually there is little difficulty in doing so if the injection has been neatly managed. A great point is to see that the patient is making deep inspirations while the injection is being given. This secures the wide patency of the rima glottidis, necessary for the satisfactory descent of the solution into the trachea."

Henri Huchard, of Paris, ³⁵ June 8, '95; ⁶⁷³ Sept., '95 expresses the opinion that the future of antibacillar medication lies in inhalations. He employs a spray in the bed-room of the patient and in all the rooms that he makes use of daily, continuing this spray for an hour and a half or two hours each time. For this purpose he makes use of the large atomizer of Lucas-Championnière, the glass bottle of which is about two-thirds filled with water, two or three table-spoonfuls of the following mixture being added each time the spray is used:—

R Guaiacol,	50 grammes ($1\frac{1}{2}$ ounces).
Eucalyptol,	40 grammes ($1\frac{1}{4}$ ounces).
Carbolic acid,	30 grammes (1 ounce).
Menthol,	20 grammes (5 drachms).
Thymol,	10 grammes ($2\frac{1}{2}$ drachms).
Essence of cloves,	5 grammes ($1\frac{1}{4}$ drachms).
Alcohol, at 90°, sufficient to make .	1 litre (quart).

The spray is used in the morning on awakening, in the evening on retiring, and once or twice during the day. By this method he obtained the recovery of a patient in the second stage of tuberculosis, after eight months of treatment. During all this time the woman remained in her rooms, breathing continually air charged with these vapors. Jaccoud, who saw her at the beginning and end of the treatment, confirms the fact of her recovery. Under the influence of the inhalations, which constituted the only measure of treatment, the bacilli first diminished and then disappeared; the sweats, cough, and expectoration also disappeared, the general condition greatly improved, and the patient gained 8 kilogrammes ($17\frac{1}{2}$ pounds) in weight. There is now a slight murmuring respiration on the right side, indicating, according to Jaccoud, the fibrous and curative transformation of the tuberculosis.

Peppermint.—De Lancy Rochester, of Buffalo, ⁶¹ June 1, '96 presented

to the American Medical Association a report of thirty-four cases of pulmonary tuberculosis treated by peppermint inhalations with creasote internally, according to the plan recommended by Carasso, whose method is to fasten by tapes over the nostrils a piece of linen ten centimetres square and folded once. On this he pours a few drops of essence of peppermint, having previously greased the nostrils so as to avoid intra-nasal irritation. The patient is directed to take eight or ten deep inspirations with closed mouth every fifteen minutes. He also swallows, every three hours, 1 teaspoonful (in half a glass of water) of the following mixture: Beech-wood creasote, 8 parts; alcohol, 550 parts; glycerin, 250 parts; chloroform, 20 parts; and essence of peppermint, 8 parts. Overfeeding is also resorted to. Two or three litres (quarts) of sterilized milk are taken daily, with meat cooked to taste, and 400 to 500 grammes (13 to 16 fluidounces) of good wine. Sputa are carefully disinfected.

According to Rochester, the great criticism to be made on *a priori* grounds against this plan of treatment is the excessive amount of fluid introduced into the body. It means one pint every three hours from 6 A.M. to 9 P.M., and one additional pint during the night. Too much milk and meat are, under the circumstances, incompatible. The lactic acid therein overcomes the hydrochloric acid of the stomach. In most phthisical cases the stomach is dilated, and the response of its musculosa to physiological stimuli imperfect. Such treatment would upset a healthy stomach, and the speaker therefore characterized it as unphysiological. As regards the inhalations of peppermint itself, he thought it was valuable and recommended its trial. In the discussion Delano Ames reported similar unsatisfactory results from Carasso's treatment in about ninety cases, but he also spoke favorably of the peppermint, the merits of which were similarly testified to by Prescott and Abbott, of Boston, ⁹⁹_{Apr. 4, '95} before the Suffolk District Medical Society. The latter authors are inclined to regard Carasso's method with favor, however.

From experiments on animals, E. R. Baldwin, of the Saranac laboratory, ¹_{May 18, '95} concludes that, while the bacillus of tuberculosis may be prevented by menthol from growing in a test-tube, its parasitic existence is not hindered by even constant inhalation of the strong vapor of peppermint. Although the latter has a high power of diffusion, its local antiseptic action in the respiratory tract is probably slight, both on the tubercle bacillus and other bacteria. An additional observation tends to confirm this latter view. Fully as many colonies developed on an agar plate made from a swab of the posterior pharyngeal wall of a patient inhaling

peppermint faithfully at the time as on others not receiving that treatment.

Ichthyol.—Scarpa⁵⁰⁵
Mar. 16, '95 treated 150 cases of pulmonary phthisis with ichthyol in the purest state,—1 part to 2 parts of water. He administered from 20 to 180 drops, dissolved in water, in the course of the day. The remedy was in all cases well borne. No other treatment was employed beyond attention to food and hygiene. Of the 150 cases 23 died; all these were in a desperate condition before treatment was begun, but even in them the ichthyol appeared to do good. Of the remaining cases 17 were apparently cured; in 50 there was notable improvement; in 32 there was some improvement; in 28, up to the date of report, the treatment had produced no effect. The good effect of the ichthyol was first apparent in a modification of the symptoms produced by the local lesions,—cough, expectoration, dyspnoea,—afterward on the general condition. Ichthyol is also recommended by Crida.⁴¹
Nov. 21, '95

Roland G. Curtin, of Philadelphia,¹¹²
Oct., '94 finds syrup of nascent phenic acid to be of most benefit in chronic cases of phthisis with slow emaciation, low temperature, and poor assimilation of food.

G. Marr Reid, of Cobden, Victoria,²⁸⁵
Feb. 20, '95 regards it as theoretically and scientifically correct to try the effect of a continuous and persistent antipyretic and bacillicide form of treatment, based on the idea of both lowering the activity and consequent virulence of the bacilli by reducing and keeping reduced the all-necessary surrounding temperature, and at the same time exposing them, when thus weakened and attenuated, to the destructive power of some trustworthy bacillicide. Antifebrin is recommended as the antipyretic, the temperature never being allowed to go above 101° F. (38.3° C.). The application of a spirit lotion to some absorbent material placed on the chest is also recommended. Inhalation of undiluted creasote, alternating with the administration of the drug by the stomach in gradually increasing doses, is the best germicide.

Purified Air.—Duncan, of Glasgow,²¹³
Jan., '95 reports two cases of phthisis, one acute and one chronic, in which a cure had been effected by treatment in a hospital ward, ventilated and warmed with washed and filtered air. More recently²
Nov. 23, '95 he reported 38 cases, out of which 4 were cured, 9 greatly improved, 6 remained *in statu quo*, and 1 became worse. The most important therapeutic factors were purified air and an equable temperature. Medicinally, counter-irritation and antipyretics (if necessary) in the acute stage; later, frequent inhalations of a mixture of creasote, eucalyptol, and pinol in equal proportions. Internally, carbonate of guaiacol and beech-wood creasote, beginning with small

doses ; 60 to 90 grains (4 to 6 grammes) of guaiacol were administered four times daily without detriment ; and of creasote, 25 minims (1.6 cubic centimetres) in olive-oil. Creasote had also been given as a suppository. Pure guaiacol had no advantage over the carbonate ; applied to the skin (20 minims in flannel, covered with oiled silk) it brought down the temperature,—in 1 case to 96° F. (35.5° C.), with symptoms of collapse. Phenol was found in the urine when the maximum dose was reached, without impairing the renal function. In 1 case in which there was acute nephritis the blood and albumin disappeared while the patient was taking large doses of the carbonate of guaiacol. There was no gastric disturbance with either drug. Where a large cavity existed, intra-laryngeal injections of menthol, 15 per cent. ; guaiacol, 4 per cent., in olive-oil—the patient lying on the affected side—had been employed with benefit. Codliver-oil and a generous diet completed the measures employed.

[Purified air can, of course, only be considered as an important adjuvant, while an equable temperature represents the advantage afforded by suitable climatic surroundings, including the excellent medicinal measures outlined ; the foregoing about represents, as a whole, the most reliable general course at our disposal for the treatment of cases for regions in which the climate is such as to preclude out-of-door life.]

Nuclein.—Victor C. Vaughan, of Detroit,⁹_{Dec. 15, 22, '94} after experiments on rabbits, etc., reached the conclusion that nuclein and nucleinic acid are powerful germicides ; that the germicidal constituent of the serum of blood is a nuclein ; that rabbits and guinea-pigs may be protected against virulent cultures of the diplococcus of pneumonia by previous treatment with hypodermatic injections of a solution of yeast-nuclein ; that the immunity thus secured is not due to the action of the nuclein as a germicide directly, but most probably depends on the stimulating action of the nuclein on some organ whose function it is to protect the body against bacterial invasion ; that, in order to obtain the immunity, the inoculation with the germ must follow soon after the administration of the nuclein. Attempts to arrest tuberculosis already developed in guinea-pigs by treatment with yeast-nuclein have been followed by varying results, depending on the virulence of the germs inducing the disease, the stage of the disease when treatment is begun, and the susceptibility of the animal. Experiments on rabbits showed that they may be rendered immune to tuberculosis by previous treatment with yeast-nucleinic acid (1 per cent.) and that the development of tuberculosis in rabbits may be prevented when the treatment is begun within three or four days after

inoculation. Stimulated by these results, Vaughan, after trying this method of treatment in twenty-four patients, tabulates the conclusions reached as follows: (1) in cases of pulmonary tuberculosis with cavities it does no good; (2) in long-standing cases it may retard the progress of the disease so long as secondary infection with pyogenic germs does not occur; (3) a temporary cure (the cases have not been long enough under observation to say more) may be obtained in early cases of small area. Finally, Vaughan states that the nucleins in other substances may act equally well as yeast-nucleinic acid. Favorable results from nuclein were reported by M. O. Teigen, of Minneapolis, ⁸⁰June 15, '95; R. W. Wilcox, of New York, ¹⁵Oct., '95, and others, but the number of cases is too limited to afford reliable data.

Cinnamic Acid.—A. V. Moschcowitz, of New York, ⁵⁹Mar. 2, '95 discusses the method proposed by Landerer, of Leipzig, in 1891 ("Anweisung zur Behandlung der Tuberculose mit Zimmtsäure," Leipzig, 1891),—viz., intra-venous injections of cinnamic acid. Only the cinnamic acid prepared from storax is to be used; this is made into an emulsion with oil of almonds and yolk of egg, rendered alkaline, and injected into the cephalic vein, the amount of the emulsion injected being from 5 to 12 drops. The emulsion contains about 5 per cent. of cinnamic acid. Moschcowitz has not obtained as good results as those recorded by Landerer, but he considers them sufficiently encouraging to justify him in calling the attention of the profession to the method. Six out of eleven cases showed marked improvement. Mader, ⁸No. 50, '94 on the contrary, has had no good results whatever from the treatment, and states that he observed marked depression after the injection, with severe pains in the sacrum, head, and chest.

In a recent communication Landerer ⁶Oct. 19, '95 reported the results of experiments on animals, showing that the internal administration of cinnamic acid caused the bacilli to lose their virulence after the fourth month and that fibroid tissue grows through the tubercles. Of 45 cases of simple chronic pulmonary phthisis without cavities treated by cinnamic acid, all but 2 showed an improvement; their weight increased, their cough ceased, and the bacilli disappeared from the expectoration. Among 190 patients suffering from external tuberculosis, the disease was situated in the bones and joints in 155 cases. Of these 6 died, 2 were not benefited, 8 were improved, 127 recovered, 2 would have to undergo amputation, and 10 were still under treatment.

Intra-pulmonary Injections.—Fernet ¹⁴Mar. 31, '95 employs intra-pulmonary injections of the following liquid: Precipitated beta-naphthol, 0.40 gramme (6 grains); gum tragacanth, 0.20 gramme

(3 grains); distilled boiled water, 20 grammes (5 fluidrachms). He injects about 0.30 gramme ($4\frac{1}{2}$ minims) of this mixture, representing 0.006 gramme ($\frac{1}{11}$ grain) of naphthol, using a Pravaz syringe. He claims that this treatment gives rise to a subacute inflammation, the fibrinous exudate from which eventually forms an area of sclerosis, preventing the farther spread of the disease to the healthy portions of the lung.

Chandebois, ²⁰⁰⁰/₉₆ in a thesis on intra-parenchymatous injections into the lung in cases of pulmonary tuberculosis, states that such injections are without danger, and that a solution of naphthol or creasoted oil is to be preferred. The method is contra-indicated if the tuberculous lesions are extensive and have passed beyond the first stage.

Treatment of Hæmoptysis.—The pathogeny and treatment of prolonged hæmoptysis in tuberculosis is discussed by A. Piassiet-sky, ⁶²¹/_{No. 50, '95} who, from an examination of several cases, concludes that thrombosis and obliteration of the vessels in the tissue which is about to ulcerate lead to an increase of tension in the lesser circulation. Through this increase the vessels, still permeable, dilate and form aneurisms, which readily yield to the increased blood-pressure and hæmorrhage results. The blood-pressure then falls and a clot forms. If there is no cavity, few vessels are obliterated and recovery from the hæmorrhage is rapid; but if the lung is riddled with cavities, it is evident that the field of circulation is diminished, and almost all the blood of the right ventricle must pass by a single branch of the pulmonary artery. In such a case it is not at all astonishing that the formation of a clot is prevented by the enormous pressure. In the same way each new cavity-formation may be accompanied by a new increase of blood-pressure and a period of hæmoptysis. In cases with extensive cavities, but with little or no hæmorrhage, there is already hectic fever, the mass of blood being diminished. It is to this cachexia that Fraentzel attributes the absence of ventricular hypertrophy in these cases, and, as it occurs early, it explains the rarity of hæmoptysis in this form of the disease; while in chronic tuberculosis cachexia occurs late; so that there may be repeated hæmorrhages. From this point of view the prognosis is more favorable in tuberculosis with prolonged hæmoptysis than without it; one of the author's patients lived eight years with hæmoptysis.

If hæmoptysis and increased tension of the lesser circulation are observed in spite of the absence of a large number of cavities, the cause must be sought for elsewhere. It may be due to inter-current pneumothorax, to a gravid uterus pressing on the abdominal organs and raising the arterial tension, or to prolonged con-

stipation affecting the circulation through the mesenteric vessels. Thus it is evident that prolonged and repeated hæmorrhage is always the consequence of exaggerated tension in the pulmonary arterial system, no matter what may be the cause of this tension. This fact is so important that the author does not hesitate, in a case of hæmoptysis due to pregnancy, to induce premature labor or even abortion if the hæmoptysis does not yield to therapeutic measures and if the tubercular process show a tendency to arrest. The excellent results obtained by emptying the gravid uterus in such a case give the physician the legal and moral right to sacrifice the fœtus.

As to the medical treatment of hæmoptysis, Piassietsky remarks on the inefficacy of the ordinary measures employed, such as subacetate of lead, infusion of ergot of rye, and perchloride of iron. Digitalis in small doses increases arterial tension, and is, hence, not to be advised; in large doses it lowers the tension, but it is then toxic. Emetics, recommended by Trousseau, lower the tension, it is true, but often cause collapse. In order to obtain good results the cause of high tension must be sought for and removed; if it is pregnancy, this must be interrupted; if it is constipation, only purgatives can arrest the hæmorrhage; if it is the tuberculosis itself, then the arterial tension must be acted upon directly, and for this purpose morphine in injections and ergotine are most satisfactory.

J. A. Van Ryn ⁸⁶⁸_{No. 11, '96} gives the results of his observations on slight hæmorrhages and their relation to atmospheric disturbances among a thousand tuberculous patients at Davos, in the practice of Spengler. The great majority of these hæmorrhages, which consist in the expectoration, a certain number of times, of sputum more or less sanguinolent, occur on days on which there is a low barometric pressure combined with a south wind or when a south wind prevails no matter what the state of the barometer. Other meteorological factors—such as sunlight, humidity, cloudiness, rain, etc.—have no influence on the appearance of hæmorrhages. More severe hæmoptysis is, in a certain measure, dependent on the same atmospheric conditions as the slight ones.

Köber ⁴_{No. 2, '96} advocates Trousseau's method—*i.e.*, remedies to induce nausea—in such cases. He states that Graves employed ipecacuanha-root in doses given repeatedly until nausea set in, while Trousseau gave it in large doses sufficient to establish vomiting. This treatment has been lost sight of, to a large extent, in modern therapeutics, and Köber warmly advocates its efficacy in severe and persistent cases of bleeding from the lungs. Morain, of Paris, ⁹⁹⁶_{Dec., '94} also recommends ipecac if the other well-known

measures fail. It may be administered in either of the two following methods: A dose to produce vomiting ($\frac{1}{2}$ to 1 drachm—2 to 4 grammes) within a half-hour or to produce nausea by giving five to six doses, at ten-minute intervals, of $1\frac{1}{2}$ grains (0.10 gramme) of pulverized ipecac.

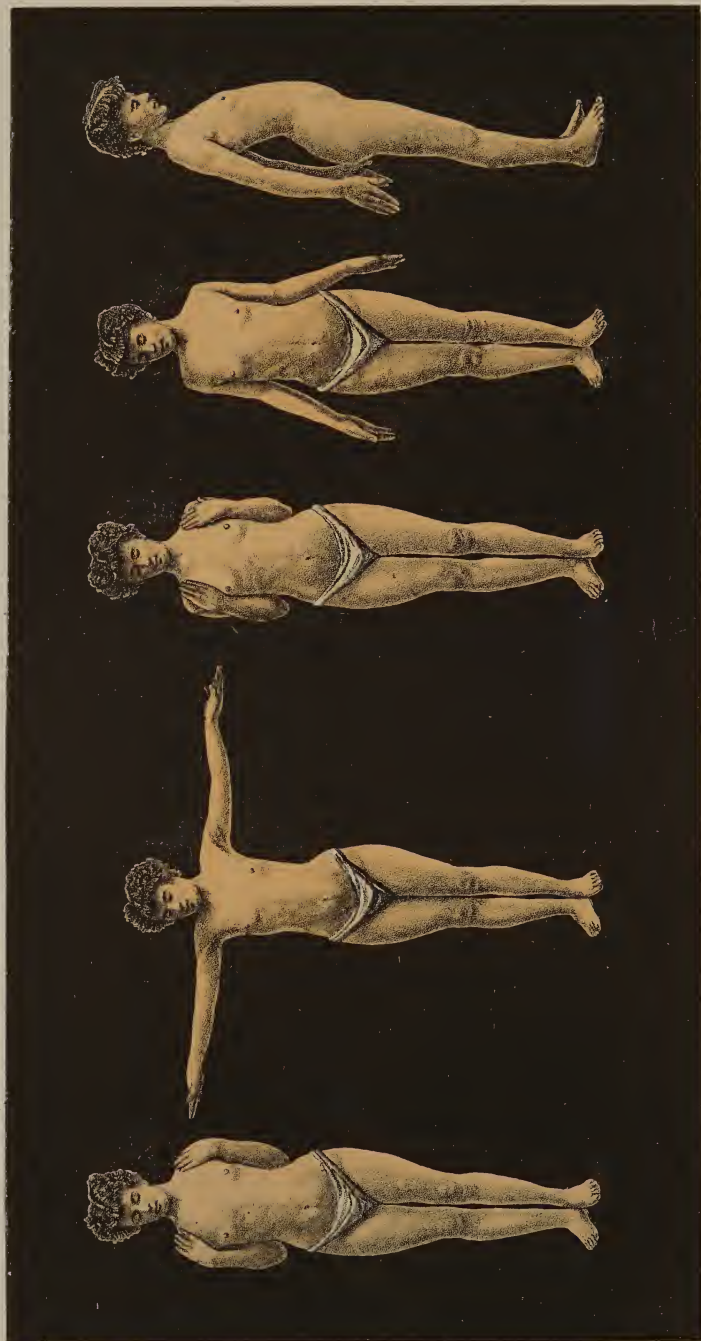
In the treatment of hæmoptysis due to the rupture of aneurisms in tuberculous cavities (aneurisms of Rasmussen) Jay⁸²⁷_{Sept. 11, '96} recommends, as the most useful remedy, large divided doses of opium, 0.005 gramme ($\frac{1}{12}$ grain) every hour or two. Opium produces peripheral vaso-dilatation about the hæmorrhagic focus, while at the same time it diminishes the attack of cough and gives a period of repose to the chest.

Treatment of Night-sweats.—Sacaze³⁴⁸_{No. 405, '94} calls attention to the value of chloralose in the night-sweats of phthisis. His patients first took 0.05 gramme ($\frac{3}{4}$ grain) in a cachet, and, if sleep did not ensue at the end of half an hour, they took another, rarely taking more than four such doses. The insomnia for which he administered the drug was overcome, while at the same time the sweating disappeared.

S. Knopf³_{V. 15, p. 134; Sept. 15, '95}⁸¹⁴ has successfully treated night-sweats by the following method: A piece of linen or cotton cloth, which is folded over three or four times to such a size as to go around and completely cover the thorax, is soaked in water at 12° to 15° C. (53.6° to 59° F.) and quickly applied over the chest, taking care that the apex is well covered. A bandage of flannel, somewhat larger than the compress, is now wrapped around the chest, and in this condition the patient remains all night. It is claimed that, thus treated, the patients usually sleep well, are not inconvenienced in the least by the compresses, and that night-sweats are either entirely arrested or nearly so. In the morning the bandages are removed and the patient is submitted to dry friction.

Vintras²¹³⁶_{Aug., '95} determined to try what influence such baths might have in improving the condition of patients suffering from consumption. The result was the finding of an almost sure means of checking the night-sweats of this disease, and, moreover, as anticipated, of determining in each case an amelioration of the general condition so marked as to encourage the author in calling particular attention to the use of these baths. W. Winternitz, of Vienna,¹⁰⁰¹_{Aug., '95}¹⁵_{Oct., '95} records a case of extensive phthisis, of three years' duration and affecting both lungs, in which the hectic fever, with its accompanying night-sweats, was relieved by cold sponging night and morning. This was one of 299 cases of phthisis observed by the author; the majority of them, however, remained under observation too short a time to allow him to speak definitely

EXERCISE A.



FIRST MOVEMENT.
Flex and rotate arms,
fingers to shoulder,
elbows at side.

SECOND MOVEMENT.
Extend arms to side,
palms down.

THIRD MOVEMENT.
Flex and rotate arms,
fingers to shoulder,
elbows at side.

FOURTH MOVEMENT.
Front and side views.
Hands down and back,
extend palms midway.

Supervised Exercise in the Prophylaxis of Phthisis (G.R. Butler)

EXERCISE B.

EXERCISE C.



Inhale, hold breath, revolve right arm twice slowly; exhale.

Arms extended to side and back, palms up. Grind shoulder blades, moving hands in small circles.

Supervised Exercise in the Prophylaxis of Phthisis (G.R. Butler).

New York Medical Journal.

EXERCISE D.



FIRST MOVEMENT. SECOND MOVEMENT.
 Extend arms at side, Palms together in front of
 palms up. body, shoulders high.

THIRD MOVEMENT.
 Front and three-quarter views.
 Rise on toes, inhale; extend arms to side and back as far as possible.

FOURTH MOVEMENT.—Correct standing position as in Exercise A.

Supervised Exercise in the Prophylaxis of Phthisis (G.R. Butler)

New York Medical Journal

EXERCISE E.



CORRECT STANDING POSITION.
Heels together, knees touching, toe out,
chest out, chin in, arms hanging
naturally. Front and side views.

FIRST MOVEMENT.
Extend arms at side,
palms up.

SECOND MOVEMENT.
Arms up, touching fingers
over head.

THIRD MOVEMENT.
Clap hands over
head, full length up.

FOURTH MOVEMENT.
Arms down to
side.

Supervised Exercise in the Prophylaxis of Phthisis (G.R. Butler).

of cure, but he has been favorably impressed by the treatment. Winternitz considers the hydropathic measures merely one factor in the treatment of phthisis, in which hygiene and diet are important considerations.

Climatic Treatment.—Samuel West, of London, ⁶_{Nov. 2, '96} remarks that the only requisite, which it appears every suitable climate possesses, is that of admitting of the patient's being as much in the open air and sunlight as possible. Wherever sufferers can spend all day out-of-doors, and, when in-doors, can still live in a pure atmosphere, they will do well.

Migneco ⁵⁸⁹_{No. 169, '96} undertook a series of experiments to determine the exactness of Koch's statement that the light of the sun killed the tubercle bacillus in a short time. He arrived at a similar conclusion, finding that sunlight either abolished or greatly attenuated the virulence of the bacillus, as, after ten or fifteen hours' exposure, it caused only local tuberculosis, while after twenty-four to thirty hours it caused no symptoms. It must, however, be noted that in certain cases, even after twenty-four hours' exposure to the sun, the bacilli were still active, though attenuated in virulence. It is, therefore, urged by the author that the sunlight be allowed to enter freely into the houses of tuberculous patients, his observations showing that sunlight must play a considerable rôle in the open-air cure of the disease.

Physical Exercise.—Otis, of Boston, ⁹⁹_{Apr. 11, '96} considers the method of treatment and prophylaxis by lung-gymnastics as too much neglected. These are especially valuable when the vital capacity is low and the chest-expansion limited.

Glentworth W. Butler, of Brooklyn, ¹_{Oct. 20, '94} published the annexed plates showing the precise course to follow when professional supervision is not attainable. The plates were prepared from photographs of a professional model; each figure represents a movement, while each series represents an exercise. A proper appreciation of the effect produced upon the thorax and respiratory muscles can only be obtained, however, by a personal trial of the movements. The author cites several interesting cases in which these measures, utilized in connection with appropriate medicinal, dietetic, and hygienic treatment, gave excellent results. T. J. McGillicuddy, of New York, ⁵⁹_{Nov. 9, '96} also insists upon the value of systematic muscular exercise as a potent adjuvant.

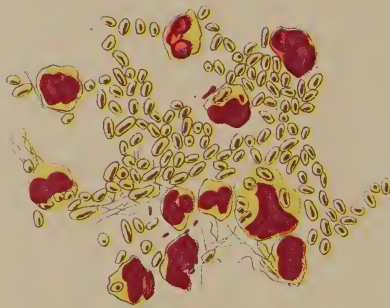
W. H. Weaver, of Chicago, ¹_{Oct. 12, '94} recommends forcible apical expansion in incipient cases, on the theory that the disease is confined to the apex from the beginning. The method he has found most useful is not only full breathing, which has been recommended in various ways, but the holding of the breath for a moment after

full inspiration by closing the glottis. The effect is increased if during the holding of the breath the lower chest is compressed with the hands. After a few weeks the inspirations become much fuller and the tension greatly increased. The arms should be raised in order to get the fullest inspirations. These efforts at forced expiration should be continued for ten or fifteen minutes every two hours during the day, before arising in the morning, and after retiring at night. He considers the holding of the breath a very important point in the treatment, requiring some practice to be done properly so as to produce a ballooning of the chest and consequently of the air-cells themselves. The immediate result will be an increased amount of oxygen in the blood, a strengthened heart-action, and a facilitated expectoration, which alone gives great relief. The treatment is, of course, applicable to the quiescent period of the disease, and the patient should be under the constant observation of the physician and should receive proper medication in order to increase the chances of recovery. To overcome the muscular atrophy about the chest the patient should use Indian clubs and dumb-bells regularly.

[This is an old and, at one time, much-utilized measure; so much so, indeed, that it was greatly resorted to by charlatans, and therefore gradually dropped by the members of the medical profession. The article is, nevertheless, quoted because the measures advocated, if properly carried out, are of positive value.]

Nutrition.—The principal mode of treatment, as is known, is hyperalimentation combined with fresh air. Blumenfeld¹¹⁴_{B.28, '06} has endeavored to determine which of the three groups of aliments—albumin, fat, or carbohydrates—are best adapted to these cases. Contemporaneous researches, notably those of Brehmer, have shown the error of attributing the greatest value to albuminoids, though these must not be excluded from the diet of tuberculous patients, as they are necessary on account of the variety they afford, thus tempting and keeping up the appetite. Blumenfeld asserts that a mixed diet is essential, largely composed of foods rich in fat, furnishing caloric to the organism. Among these, fresh butter is certainly the one most acceptable to the patients. Codliver-oil is also well tolerated and assimilated by the majority of them. Lipanin has been substituted for it in cases where it was not tolerated, but Blumenfeld's researches show that lipanin is less assimilable than butter.

John F. Russell, of New York,¹_{Dec.22, '94} used a glycerin extract of liver mixed with codliver-oil after each meal in some cases of advanced phthisis, with the object of improving nutrition. The chief value of his experiments lies in confirming the known fact



Capsulated bacilli of Broncho-pneumonia (Wright & Mallory.)

Zeitschrift für Hygiene.

that glycerin increases general nutrition and weight. He believes that this power is augmented by combining it with oil, though not necessarily codliver-oil.

Disinfection.—Sheridan Delépine and Arthur Ransome, of Manchester, ²_{Feb. 16, '95} in a report on the disinfection of tubercle-infected houses, state that such disinfection cannot be obtained by means of the ordinary fumigation methods. Sulphurous acid, chlorine, and euechlorine, as used under supervision by experienced municipal disinfectors, have proved practically useless. This only confirms the results obtained by Koch and his pupils in the case of a number of other organisms. The only other method of disinfection which seemed to them to promise more satisfactory results was the direct application of a solution of chlorinated lime to the walls to be disinfected. This method is, however, attended with discomfort on the part of those who have to carry out the disinfection. It must be remembered that the experiments of Schill and Fischer are unfavorable to the use of perchloride of mercury. Light is, in the case of the tubercle bacillus, as proved by several observers to be in the case of other organisms, the most important natural disinfecting agent.

Goriansky, of St. Petersburg, ³_{Jan. 16, '95} finds that wood-vinegar (pyroligneous acid) is efficacious in disinfecting the sputum of tuberculous patients, being more powerful than a 5-per-cent. carbolic-acid solution. Its antiseptic action probably depends on the presence of the guaiacols in acid solution and of about 5 per cent. of acetic acid. He has ascertained that, an equal quantity of wood-vinegar being added to the sputum, all bacilli are killed within six hours. Spengler ³_{Oct. 31, '94} recommends a 2-per-cent. solution of para-chlorphenol as an effective disinfectant. (See "Hygiene," vol. iv, section G.)

Pneumonia.

Pathology.—J. H. Wright and F. B. Mallory, of Boston, ⁵⁸_{Aug. 16, '95} describe a new capsular bacillus found by them, in addition to the Klebs-Löffler bacillus, in the lungs of a man who, three weeks after diphtheria, died with severe bronchopneumonia. The new bacillus was found in the secretion from the bronchi and in the alveoli of the lungs in great numbers. It was easily cultivated on blood-serum, agar-agar, gelatin, and potato; the pure cultivation injected into mice subcutaneously and into the veins of the rabbit caused death from septicæmia in twenty-four hours; injected into the trachea of the rabbit it caused death from septicæmia in five days; no definite pneumonia was produced. As may be seen in the annexed plate, the bacillus is two or three times as long as it

is thick, has the ends rounded, and is inclosed in a definite capsule, which is seen in cultivation; it is not mobile, shows no tendency to formation of spores, and stains well by Gram's method. The organism belongs to the same group as Friedländer's pneumonia bacillus, though differing in several points from that bacillus. It is probably identical with some already described, perhaps with that described by Fasching in the nasal secretion of influenza. The plate shows a broncho-pneumonic exudate-focus composed of leucocytes, capsular bacilli, and a little fibrin.

The action of the pneumococcus upon sugars has been studied by L. Grimbert, ²⁶²_{Nov. 25, '95} who repeated the experiments of Frankland with a pneumococcus from the Pasteur Institute, possessing all the classical characteristics of the organism. His results differ entirely from those of the English author and show that there exist at least two pneumococci of Friedländer, resembling each other morphologically, but differing from each other in their action on sugars. Grimbert, therefore, believes that in studying henceforth a bacterium presenting all the characteristics of Friedländer's pneumococcus it should be tested on glycerin, in order to identify it either with Frankland's organism or the one studied by himself.

Duncan, at the Indian Medical Congress, ⁶_{Jan. 19, '95} gave the details of an epidemic which, in his opinion, proved without doubt the infectious character of the disease. He did not consider the theory of cold as a factor of any value, since the disease is more frequently met with and more common in warm than in cold climates, and in hot than in warm climates, showing a gradually increasing ratio from the poles to the equator; and, other things being equal, it increases uniformly in frequency the nearer we approach the tropics.

Lancereaux, of Paris, ⁴⁵¹_{Dec., '94} on the contrary, expresses the opinion that, if cold is not the real cause of the disease, it certainly is a predisposing one. He does not believe in the microbe of pneumonia; as the disease is seasonal, he asks why the microbe is dangerous in some months and harmless in others. Talamon, of Paris, ³¹_{Mar. 20, '95} regards the contagious character of pneumonia as undoubted, and gives three cases in point to confirm his statement, two fatal, the other passing through a pneumonia of the severest type, with albuminuria remaining after six weeks,—an exception to the general mildness of pneumonic nephritis. This points to an exaltation of the virulence of the microbe during its sojourn in the lungs of the contagion-giving patient. Malenchini ³⁷⁶_{Aug. 6, '95} describes a local epidemic in Florence presenting all the characters of virulent pneumonia. The prevailing theory in that city as to cause

of the epidemic was to the effect that it was due to imported parrots. The author considers this as a mere supposition.

[In an able editorial the *Lancet* states that the opinion of clinicians has for years inclined more and more to the view that it is impossible to explain pneumonia as a simple inflammation of the lungs. The abrupt onset, well-defined course, and definite crisis characteristic of the disease, the fact that the pulmonary lesion and the clinical phenomena do not run *pari passu*, the occasional occurrence of epidemics,—these and many other facts point to the conclusion that the true nosological relations of pneumonia are with the specific fevers rather than with the inflammations.]

John S. Billings, Jr., of Baltimore, ⁷⁶⁴_{Nov., '94} states that in cases of croupous pneumonia pursuing a favorable course there is, as a rule, a marked increase in the number of the leucocytes during the febrile period of the disease. This leucocytosis is probably present at the time of the chill and may be very marked within a few hours. There is no correspondence between the daily temperature and leucocyte-curves during the febrile period. In those cases in which the temperature-curve falls by crisis the leucocyte-curve begins to fall within a few hours of the same time. The fall of the latter is only partial, however, and rarely reaches normal as soon as the temperature-curve, generally taking about forty-eight hours longer. In cases ended by lysis the two curves fall together, the temperature always reaching normal first. The presence or absence of leucocytosis only shows the virulence of the bacterial poison, but is not to be considered a criterion of absolute prognosis.

Similar studies have been made by Stiénon, of Brussels, ⁸⁶⁸_{v. 4, No. 1, '95} confirming the theories advanced by Wérigo, Éverard, Demoor, Massart, Sherrington, and others, both from clinical and experimental research. Stiénon finds that the febrile period is frequently accompanied by an increase of leucocytes, the majority being advanced in development. This condition of the blood may be due to a special division of the white cells in relation to their chemotaxic functions and phagocytic rôle, but, in view of the rarity of young cells at this period, he thinks it likely that the latter must mature abnormally early, thus facilitating their emigration and hastening their destruction. When the febrile cycle is ended, the number of leucocytes may remain elevated, but with the difference that the young cells appear in extraordinary numbers, showing the reparative process which the blood, as well as the other tissues of the economy, is undergoing.

Petroff ⁵⁸⁶_{No. 43, '95} who has also studied the subject, concludes that, with few exceptions, the white corpuscles are increased in pneu-

monia, being sometimes even doubled or quadrupled. Leucocytosis develops very soon after the onset of the disease, increasing progressively until the eve of the crisis and disappearing after it, either suddenly or little by little, the variations being similar to the variations of temperature. There is probably a direct relation between the number of white corpuscles and the extent of the region involved, but there is no direct relation between the fever and the leucocytosis; the two phenomena, however, being probably dependent on the same cause, present a certain parallelism. Leucocytosis is less marked in feeble individuals; in fatal cases it may be intense, feeble, or even absent, according to the constitution of the individual, the extent of the lesions, and the intensity of the affection. (Report of Corresponding Editor Drzewiecki, Warsaw.)

[These researches are particularly interesting in connection with phagocytosis. See "Immunity," in vol. ii, section J.]

The action of the pneumococcus on the hæmoglobin has been studied by Pacinotti.⁵⁰⁵ No. 56, '95 As is known, the sputum in pneumonia, after presenting a reddish color, changes progressively in color from a prune to an apricot and then loses its color. The blood contained in the areas of hepatization presents similar changes of color. From his experiments Pacinotti believes these modifications to be due to the action of the pneumococcus on the blood. The microbe, as has been demonstrated, can live in the blood and is found there from the second day of the disease, producing the changes in blood and sputum by reducing and decomposing the hæmoglobin.

It is generally admitted that the acute œdema of pneumonia is consecutive either to an active congestion of the lung, to blood-stasis from feebleness of the heart, to hydræmic or special toxic conditions of the blood, to vasomotor disturbances, or paralysis of the pneumogastric. Rivalta, of Rome,¹¹⁶⁷ V. 33, '95 has arrived at different conclusions, though he admits that these factors may sometimes be responsible. At the autopsy of 51 patients dead from fibrinous pneumonia he found pulmonary œdema in 33, invading the entire lung in 22 cases, in 6 the base, and in 2 the apex. He is led to believe that it is an intra-alveolar inflammatory reaction directly produced by the diplococcus of Fränkel. Death in most cases is due to a too great diminution of the respiratory field, and acute œdema, associated or not with hepatization, is one of the agents in this diminution.

A. Fränkel⁶⁷³ Sept., '95 discussed, from an anatomical and clinical stand-point, the subject of pulmonary inflammation ending in induration. Ordinarily acute and subacute inflammations are superficial, simply involving the alveoli for a certain period; how-

ever, there are exceptions to this rule, the inflammation sometimes ending in induration. Certain authors deny such a termination of the disease, but Fränkel believes that, though it occur but rarely, perhaps in only 1 per cent. of the cases, it nevertheless does occur. Anatomico-pathologically the surface of the lung in indurated pneumonia is found, upon section, to be smooth and its tissue resistant, while in ordinary fibrinous pneumonia it is granular with friable tissue. In the indurated variety the surface of the section sometimes shows a peculiar transparency, with characteristic yellow specks, due to the collection of cells, which have become fatty. Under the microscope the alveoli are seen to be blocked up by connective tissue resembling polypi, containing vessels and by their structure recalling the process of organization of thrombus. The clinical symptoms of induration are continuation of fever, persistent dullness, and progressive retraction of the thoracic wall.

Pathology of Croupous Form.—A. E. Wright, in a discussion before the London Pathological Society, ^{Feb. 2, '95} stated that the lesions characterizing croupous pneumonia should be considered as the result of an acute phagocytic reaction of the organism in response to a bacterial infection of the lungs, the pneumococci of Fränkel being the infecting agent. To his mind, the emigration of white blood-corpuscles into the alveoli of the lungs is entirely comparable with the emigration of white blood-corpuscles into the subcutaneous tissues which constitutes an ordinary abscess. The white blood-corpuscles which emigrate are in both cases polynuclear, and the subcutaneous abscess, equally with the pneumonic, may be the result of a pneumococcal infection. There are, however, important clinical differences between an attack of croupous pneumonia and a subcutaneous abscess. Chief among these is the fact that pneumonia runs a definite course and terminates by a crisis, evidently marking some critical event in the conflict between the organism and the bacteria, but probably not an evidence of a local change occurring in the inflamed lung.

Hauser, ⁷⁶⁸_{B.15,p.527} ranks croupous pneumonia as a typical croupous inflammation to be placed side by side with those of the mucous membranes, the process being exactly similar. The mode of formation of the false membranes, their relation to the consecutive coagulation of the inflammatory infiltrate, and the entire disappearance of the fibrinous net-work filling the alveoli justify the supposition that here, also, the coagulation of the fibrin is due to an exchange between the cellular protoplasm and the inflammatory exudate.

A. P. Ohlmacher, of Cleveland, ¹_{Apr. 27, '95} found the diphtheria bacillus in the substance of the affected lung in a case of primary,

right-sided, lobar pneumonia, complicated with an acute, purulent meningitis. The diphtheria bacillus obtained from this case was studied through several generations and was found to possess the usual morphological and physiological characteristics of this species. It is a moderately long example of this bacillus, with a tendency to form the irregularities in shape usual in the longer varieties. It is non-motile, does not liquefy gelatin, does not coagulate milk, does not grow visibly on potato, and produces acids in early cultures in glucose-litmus-agar. As shown by the effects of inoculations into guinea-pigs, the pathogenic virulence of this particular example of the diphtheria bacillus is of a low grade.

In a case seen by V. Negel ¹¹⁵³_{Nov. 2, '95} marked soreness of the throat suddenly appeared. Examination of the buccal cavity revealed the existence of whitish, false membranes, adherent and localized to the uvula and to the right posterior pillar. There was no engorgement of the submaxillary glands, but the left parotid was slightly tumefied and painful to pressure. Bacteriological examination of the false membrane was made and disclosed only cocci, diplococci, and streptococci.

Kutscher ⁵⁸_{B. 18, '94} has met with the diphtheria bacillus in areas of broncho-pneumonia in ten cases. He made sections of the pulmonary lesions, after hardening, and stained them by a modification of Gram's method. The diphtheria bacilli were found in the cellular exudate of the alveoli of the lungs, and often even in the interior of the cells. The pulmonary tissue itself did not contain them; only a few were found in the perivascular lymph-spaces and the bronchi. Streptococci were often associated with the diphtheria bacilli in the pulmonary foci. The author also found the diphtheria bacillus in one case in the kidneys.

Acute Form.—Bollinger ³⁴_{Aug. 6, '95} ²_{Aug. 24} mentions that death in acute pneumonia is usually attributed to (1) inefficiency of the lungs owing to extensive consolidation; (2) severity of the infection, as in septic forms of pneumonia; (3) complications, such as meningitis, pericarditis, etc.; (4) heart-failure, which may be due to inherent weakness in the heart or be brought about by the pneumonic infection. Individual resistance is also an important factor. The author draws attention to two facts noted after death from acute pneumonia: (1) the general anæmia of all organs and (2) the absence of so-called collateral hyperæmia in parts of the lungs unaffected by the pneumonic process. The author would attribute this to the extensive exudation, which robs the blood of its most important elements. The results of this exudation are practically similar to those produced by the recurrent internal hæmorrhage

noted in some of the infections. The leucocytosis seen in acute pneumonia is a regenerative process to compensate for the loss to the blood occasioned by the exudation. Thus the author thinks that the critical collapse manifestations in croupous pneumonia and the fatal cardiac insufficiency are due to the oligæmia, which leads to an inadequate nutrition of the cardiac muscle. Finally, he draws attention to the harm done by blood-letting. Fluid should be administered by all possible methods; perhaps even the infusion of saline solution should be adopted to compensate for the oligæmia.

In this connection the following case, described by Galvagni, of Modena, ⁶⁷³_{Apr., '95} might prove interesting. A robust young man of 19 years entered his clinic with left basal pneumonia. The pulse was 120, feeble, and arrhythmic. An intra-venous injection of 200 grammes ($6\frac{1}{2}$ fluidounces) of chloride of sodium 0.75 per cent. and bicarbonate of sodium 0.50 per cent. was made, and within two hours the patient had a chill, followed by abundant perspiration, defervescence being complete in four hours. In ten hours, however, the temperature rose to 39° C. (102.2° F.), but at once fell, and five days after his entrance into the hospital the patient left, entirely recovered. Similar treatment was employed in several cases by Galvagni, and always with similar success. He believes that the majority of cases of cardiac paralysis in pneumonia are due to coagulation of blood in the heart, and this the injection prevents.

Atypical Forms.—Hanot, ⁵⁵_{Dec. 22, '94} relates a case of vagus pneumonia,—the fourth of the kind recorded in France. The pressure on the pneumogastric was due to enlarged carcinomatous mediastinal glands, and led to pleuro-pneumonia with necrosis and suppuration. According to Meunier, of Paris, ³⁶⁰_{Jan., '95} who goes thoroughly into the literature of the subject, lesions of the pneumogastric centres may in some cases account for the pulmonary changes.

At the present time a neuro-infective theory must be added to the others advanced to account for vagus pneumonia. In an early stage the morbid lesions found are emphysema, increased bronchial secretion, congestion, ecchymoses. Later they are of an inflammatory order.

Arader ⁸_{No. 22, '95} ¹¹²_{Nov., '95} reports an interesting case of intermittent diplococcous pneumonia,—an uncommon form. The case was a moderately severe pneumonia lasting six days, during which there occurred attacks of continued fever, lasting forty-eight, twelve, fifteen, and seven hours, between these attacks there being intermissions of from nine to thirteen hours' duration. The bacterio-

logical examination of the characteristic reddish-brown sputum permitted the diagnosis of a true croupous pneumonia. The cause of the affection was the diplococcus lanceolatus, to which was also ascribed a later-occurring pleural exudation. There were no influenza bacilli nor streptococci. The intermittent character of the pneumonia is explained on the assumption of a mixed infection with malaria, or, what is more probable, the diplococcus pneumoniae was modified by a previous malarial change of the blood or nervous system.

Albert Robin and Leredde, of Paris, ³⁶⁰June, '95 from the observation of a case of acute broncho-pneumonic tuberculosis, conclude that there exists in the adult a variety of acute pulmonary tuberculosis for which the name of "acute tuberculous broncho-pneumonia" may be reserved, in which the general symptoms predominate in a remarkable manner, while the latency of the local symptoms renders the diagnosis especially difficult.

A case of traumatic pneumonia related by C. Guérin ²⁴³Sept., '94 demonstrates the influence of traumatism in pneumonia,—an influence denied by certain authors. This case, which, except for high temperature at the outset, followed a classical course, is interesting on account of the rarity of such cases.

Mongour ²⁵Oct., '94 also relates two cases in which pneumonia ensued upon injuries to the chest, and refers to another case, recorded by André Petit, in which the patient had a typical attack of lobar pneumonia, commencing in the neighborhood of a contusion of the chest. In this case also the sputum contained the pneumococci. In Mongour's two cases the disease did not run quite a typical course, though in the first one mentioned the temperature fell by crisis.

Symptomatology.—J. P. Crozer Griffith, of Philadelphia, ⁵⁹May 25, '96 alluding to the diagnosis of pneumonia in children, stated that a limited area of dullness is easily overlooked unless light percussion is employed, and even then, sometimes, there will be no dullness during the attack; sometimes the disease is diagnosed as existing on the wrong side, due to affected lung being obstructed as to air; while the unaffected lung performs the functions of both and is less resonant on percussion. Broncho-pneumonia may simulate croupous pneumonia very closely in all the local symptoms. The pain in pneumonia is sometimes referred by children to the abdomen.

J. Hughlings Jackson, of London, ⁶Dec. 22, '94 has found the knee-jerks absent in some cases of croupous pneumonia, in one of which there was inaction of the intercostal muscles during ordinary (but very frequent) breathing, but perfect action when the

patient was told to draw in his breath; that is to say, the muscles acted in voluntary, but not in involuntary, respiration. On recovery the knee-jerks returned and the muscles acted perfectly. Jackson surmises that in cases of ordinary, undoubted croupous pneumonia there is some morbid change of the cord caused by pneumotoxin, and he suggests that the central lesion is the cause of the non-pulmonary symptoms of pneumonia, the high temperature, rapid respiration, and infrequent pulse (only in relation to the respiration-rate). He does not think the local pulmonary inflammation would produce such symptoms in such relation.

Pleuritic effusion, occurring as a terminal symptom of pleuropneumonia, is described by B. F. Westbrook, of Brooklyn, ⁵⁹Mar. 9, '96 who diagnoses the condition simply by the observation of the following facts,—viz., the occurrence of pneumonia of, as a rule, more than the average degree of intensity, associated at its onset with the signs of acute pleurisy, which are quite variable and the most certain of which, the friction sound, is apt to be of short duration and not followed by evidences of serous effusion; râles, somewhat like a nondescript mucous râle, fine or coarse, usually both, following the friction and frequently enduring until the beginning of resolution of the pneumonitis; closely following upon the signs of commencing resolution, a change in the percussion-sound, which becomes flat; either absence or presence of the vibratory breath and voice sounds of pneumonic hepatization (vocal fremitus and bronchophony), as coincidences of the change in the percussion signs; at the same time, sinking of the intercostal grooves during inspiration, followed by bulging if the accumulation is large; return of the cyanotic appearance of the skin and mucous membranes, and increasing rapidity with diminishing vigor of the heart-beat. Later on there may be, of course, other signs and symptoms of pleuritic effusion, such as cardiac displacement, jugular engorgement, cerebral and spinal venous hyperæmia, errors in the distribution and movements of the cerebro-spinal, subarachnoid fluid, portal congestion, and the other items of that long series of disturbances which result from the presence of large quantities of liquid in the pleural cavities and constitute one of the most interesting chapters in pathology.

Edouard Tordeus ⁸⁶⁸Nov. 23, '96 has studied the relation between croupous pneumonia and hepatomegaly. He calls attention to the tumefaction of the liver which develops not during the evolution of the pneumonic process, but after the crisis, after deferescence. He has observed this in four cases under the same conditions, coming on after the crisis.

Talamon³¹_{Mar. 20, '95} regards herpetic eruptions as due to individual peculiarity, not to the disease. Many persons present the outbreaks at other times, and hence are liable to them during a pneumonic attack. They are not to be regarded as critical, appearing, indifferently, either early or late in the disease. Moreover, they are not coincident with the fall of temperature or any modification of the general or local state. Where present the prognosis is not always good, though this holds as a rule. G. Sée noted a mortality of 9 per 100 in pneumonia with herpes, as compared with 25 to 30 per 100 in pneumonias taken *en bloc*.

Complications.—Popoff⁶⁷³_{Apr., '95} reported four cases recently under his care in which acute nephritis occurred in the course of pneumonia. From these four cases Popoff concludes that nephritis generally appears on the fourth or fifth day of the pneumonia, the most common symptom being bloody and scanty urine. Anuria or uræmia may supervene, but the casts and hæmatins generally disappear rapidly. The duration of the nephritis may vary from eight to seventy days, though the average duration is from fifteen to thirty days. Caussade⁶⁷³_{Oct., '95} described a case proving that the pneumococcus may affect the kidney several days before the signs of pneumonia proper become evident.

Clara T. Dercum, of Philadelphia,¹⁹_{June 1, '95} reports a case of frank pneumonia terminating in abscess of the lung. The patient expectorated over a pint of blood, mucus, and pus when the abscess burst internally. Considerable pus and *débris* were expectorated for a period of about six weeks, when the expectoration ceased. A small abscess that had formed on the sacrum over a bed-sore was opened and found to lead by a fistulous tract to a large abscess in the right buttock, which discharged over a pint of pus. Although this abscess was packed and treated antiseptically, it discharged for fully six weeks.

E. B. Goelet, of Saluda, N. C.,⁴³_{Nov., '94} observed gangrene of the lung following pleuro-pneumonia. A case seen by Bosquier²²⁰_{Sept. 14, '95} terminated in pulmonary gangrene, univalvular hypertrophic endocarditis, and enormous renal infarcts.

Pochon⁶⁷³_{Sept., '95} observed a case of broncho-pneumonia in a girl of 2½ years, of somewhat delicate appearance. The course of the disease was severe, and after about fifteen days the limitation of the murmurs to the apex of the lungs led the author to fear a possible tuberculosis, when the appearance of a new phenomenon showed the case to be one of generalized infection, due to the pneumococcus. Without any previous symptoms calling attention to the abdomen, an immense quantity of greenish-yellow, inodorous pus issued from the umbilicus, pressure over the loins increasing

the flow. This suppurative peritonitis had been insidious in character, the temperature not having gone beyond 37.5° C. (99.5° F.) for several days, and not rising at the moment of evacuation. The pus contained the pure encapsulated pneumococcus of Talamon-Fränkel, killing mice in twenty-four hours after inoculation under the skin.

Involvement of the cerebro-spinal axis was illustrated by several cases. Jules Simon, of Paris, ³¹_{Dec. 19, '94} reported two cases of pneumonia in which meningitis occurred as a complication, and John H. W. Rhein, of Philadelphia, ⁵¹_{Sept., '94} observed a case in a child, 3 years old, with meningeal symptoms and jaundice. F. Tabier, of Lille, ²²⁰_{Jan. 29, '95} has reported a case of traumatic pneumonia, gangrenous in character and accompanied by pneumothorax and purulent pleurisy, which resulted in death on the eleventh day from suppurative meningitis. That traumatic pneumonia should occasion complications presenting such kinship with those resulting from other forms is worthy of notice.

Isager ³⁷³_{B.2, p. 1042} observed aphasia in a boy 9 years old. The aphasia was complete, the boy being unable to speak, to repeat words addressed to him, or to read; but he could understand and execute orders such as to stand up, show his tongue, etc. After a fortnight the aphasia gradually disappeared.

W. M. Leszynsky ²⁴²_{Dec., '95} presented a man to the New York Neurological Society who had suffered from neuritis of the brachial plexus. Cases of peripheral paralysis were also reported by Bozzolo ⁵⁸⁹_{Jan. 16, '95} and Westhoff. ¹²¹_{July, '95} A case of critical delirium after pneumonia is reported by Calandruccio. ⁵⁰⁵_{No. 127, '95}

Voute, of Amsterdam, ¹¹⁸¹_{Feb. 15, '95} observed right external oculomotor paralysis in the course of acute pneumonia of the left apex in a child of 2½ years. There was no doubt as to the relation between the two affections, the paralytic symptoms diminishing as resolution of the pneumonia took place. Voute regards the paralysis as of toxic rather than meningeal origin, on account of the absence of all cerebral symptoms.

Vogelius ³⁷³_{No. 10, '95} ⁶⁷³_{July, '95} observed two cases of suppurative arthritis developed in the course of genuine pneumonia. In one the sterno-clavicular articulation was affected, in the other the hip-joint; in both pneumococci were found in the pus. (Report of Corresponding Editor H. Mygind.) Meunier ³⁶⁰_{Nov., '94} also reports a case of arthritis complicating acute pneumonia in a man aged 60 years. On the fourth day of the disease his knee became swollen and painful. On admission, on the twentieth day, he still had slight signs of the past pneumonia. The swollen joint was punctured with a fine needle and a dirty-yellowish liquid obtained. This

liquid, examined bacteriologically, showed not only the pneumococcus, but also the streptococcus.

Haushalter and Viller, of Paris, ³⁶³_{July 6, '95} describe a case of purulent ophthalmia with pneumococci in an alcoholic patient suffering from influenzal pneumonia. F. P. Ball ⁹_{Sept. 21, '95} reports three cases from his own practice in which otitis media occurred, complicating a case of the catarrhal form.

Hobbs, of Bordeaux, ²⁵_{Jan., '95} relates a case of inflammation of the parotid gland as a complication, in which the pneumococcus was not, in his opinion, the etiological factor, the parotiditis being of the common form and the result of the debilitated condition produced by severe pneumonia. John H. Carslaw, of Glasgow, ²¹³_{July, '95} also treated two similar cases, in which subsidence took place without suppuration, suggesting that the prognosis, under such circumstances, is not necessarily as grave as has been claimed by many authors. Suggestive in this connection is the case observed by Negel, of Budapest, ²²³_{No. 1, '94} in which pneumonia was followed by acute orchitis, which he believes to have been of metastatic origin.

Treatment.—As is known, Fochier, of Lyons, recommended in certain cases of puerperal infection injections of essence of turpentine, which, by provoking local abscesses, would act favorably on the general disease. Although Chantemesse and Marie did not obtain the desired result in eight cases of acute pneumonia, ¹⁴_{No. 44, '92} Pinna, ⁵⁰⁵_{No. 129, '95} basing himself on the success obtained by Lépine, Dieulafoy, Bard, and Mercandino, and when all other methods had failed, tried Fochier's plan in the case of a patient, 55 years old, suffering for seventeen days from apyretic and adynamic pneumonia, in which the diagnosis, based on the physical signs and the presence of numerous diplococci in the sputum, was undoubted. The day following an injection of 1 cubic centimetre ($15\frac{1}{2}$ minims) of essence of turpentine the pulse went up, the dyspnoea was relieved, the temperature rose suddenly to 39° C. (102.2° F.), to fall within the subsequent days to normal, with the cessation of pulmonary phenomena. In the meantime an abscess formed at the site of the injection, which, on being opened, gave issue to fifty cubic centimetres of perfectly sterile pus. Bacteriological examination, directly and by cultures, revealed no microbe of any species. The abscess healed in several days as the patient recovered. This case led Pinna to carry out some experiments which throw an interesting light on the mechanism of Fochier's method. The latter author believed that the artificial abscess acted by localizing the septic germs (fixation abscess); but, in the present case and in some others (those of Fochier himself, of Dieulafoy, and of Mercandino), the pus having been found sterile,

the action was probably different. By injecting successively and at different times into rabbits the pus from the abscess in Pinna's case, and then the pus from a common case of pneumonia, the author observed that the animals survived and remained healthy for an entire month, while the same quantity of pneumonic pus introduced without the preliminary injection of the pus from the artificial abscess killed them in thirty-six hours, from acute pneumococcus septicæmia. The method of Fochier thus appears to act by developing, at the point of the artificial abscess, a special antitoxic substance.

An editorial writer ⁶_{Feb. 16, '96} says the question of immunity and the allied subject of the use of "curative serum" has been studied experimentally in pneumococcus infection for some time, notably by G. and F. Klemperer, of Munich; indeed, some of the earliest work on "antitoxins" was that done on the occasion in question by these observers. They treated ⁶_{Jan. 20, '96} 12 cases of pneumonia with the serum of rabbits rendered artificially immune. Each dose consisted of from 5 to 10 cubic centimetres ($1\frac{1}{4}$ to $2\frac{1}{2}$ fluidrachms) injected under the skin of the buttock. Eliminating 5 of the cases in which crisis resulted as in the ordinary course of the disease, in the remaining 7 each time the serum was administered there was a diminution in the height of the temperature and in the frequency of the pulse and respiration, and the patients made a good recovery. They have also injected 8 patients with cultures of the pneumococcus which had been heated to 60° C. (140° F.) and so deprived of toxicity. The results were very satisfactory, the temperature falling soon after the injections. They also inoculated patients with the serum of other patients suffering from pneumonia obtained immediately after the crisis. After the inoculations the temperature became lower and frequently deservescence at once followed. Foà and Carbone reported a case of pneumonia which was arrested on the fourth day after injections of the serum of a vaccinated rabbit. Foà and Scolia injected 10 patients suffering from pneumonia with from 5 to 7 cubic centimetres ($1\frac{1}{4}$ to $1\frac{3}{4}$ fluidrachms) of the serum of rabbits which had been rendered immune, the injections being given under the skin of the back.

T. J. Mays, of Philadelphia, ²³⁴_{Nov., '94} calls attention to the fact that the pyrexia of pneumonia does not yield in the same way as does that of typhoid fever. It is best subdued by cold applied directly over the affected lung as well as to the head. Ice-bags wrapped in towels should be applied over the entire affected area, moving them about with each migration of the morbid process. The length of time for which cold is to be used must, in most

cases, be decided by the amount of fever present. If this fall to or near the normal point and show a tendency to remain there, then the ice may be gradually removed. It is best, however, not to be in too much haste in withdrawing the cold, for frequently, before this is off very long, the temperature suddenly flies up again. If this take place and the temperature remain high for some time after the ice is re-applied, it is a possible indication that the inflammation has invaded a new field and become inactive in the old one. It must always be borne in mind that the ice is not employed solely for the purpose of reducing the fever, but rather with the object of circumventing the exudative process and of hastening resolution in the affected part. There may be very little fever present in some cases of pneumonia, as in the aged, yet the destructive changes are going on in the lungs at a rapid rate. In senile and latent pneumonia the activity with which the ice is employed must be governed entirely by the impression which is made on the pulmonary disintegration. This, and not the temperature, must be the objective point.

A year later Mays ⁷⁶⁰_{Dec. 7, '95} presented conclusions based upon the answers received from members of the profession who had been invited, through the medical press, to report the results obtained from the local application of cold. Among the 195 cases there were 7 deaths (4 males and 3 females), or a mortality of only 3.58 per cent. The oldest of these was 74 and the youngest was 16 years. Three were cases of double and 4 of single pneumonia. Mays remarks that, whatever opinion we may hold in regard to the value of any treatment, it is quite obvious that, in the long run, the verdict will favor that one which shows the smallest mortality-rate, and, compared with results usually obtained, the proportion is certainly remarkably small. He states that cold reduces the pyrexia, strengthens the pulse, tones up the heart, diminishes the pain in the chest, alleviates difficulty of breathing, and gives greater comfort to the patient. In virtue of its powers to stimulate nerve-functions and to contract small blood-vessels it promotes the pulmonary circulation, relieves stasis, hastens resolution, and disperses the products of exudation.

Comby ¹⁴_{May 19, '95}; ⁶_{June 1} calls attention to the excellent effects yielded by balneotherapy in the pneumonia of quite young infants. Applied at a temperature of 25° or 20° C. (77° or 68° F.), according to age and circumstances, the cold bath is most serviceable in reducing the temperature, restoring lost tone, and slowing the pulse and respiration. Chemical antithermic agents, such as antipyrin, quinine, etc., are generally useless and may be dangerous. In his wards Comby gives cold baths to all his little pneumonic patients

whose temperature exceeds 39° C. (102.2° F.) and whose hearts are not diseased. Masse, of Bordeaux, however, ⁵⁹_{July 1, '95} questions whether the process is reasonable in young children, in whom the disease generally pursues a favorable course.

Rendu ³⁵_{Nov. 24, '04} expresses himself as a partisan of cold baths in pneumonia, combined with measures to sustain the heart, such as digitalis in the first stages and caffeine or sparteine later on.

In broncho-pneumonia, Nothnagel, of Vienna, ²²_{Jan. 9, '95} uses water-baths or Priessnitz's wet cloths to avoid asphyxia, cyanosis, and carbon-dioxide poisoning. To avoid venous stasis the position of the patient is changed every hour, and he is not allowed to remain long on his back. He is also made to take four or five deep inspirations every half-hour. Decoction of senega and ammonium chloride may be of special value in certain cases to aid expectoration, and morphine with cherry-laurel water for severe cough. For tenacious secretions the stimulating expectorants, as benzoic acid and senega, are indicated, or sodium chloride with warm water as an inhalation may give relief.

The method of ice-cradling recommended some years ago by W. Soltan Fenwick ⁶_{Jan. 31, Feb. 7, '91} has been tried in five cases by P. Blaikie Smith, of Aberdeen, ²_{May 11, '95} who from his results is disposed to recommend the plan as a mild form of antipyretic treatment, suitable for sthenic cases of acute pneumonia, easy of application, not violent in its effects, comfortable and not fatiguing to the patient, and capable of being carried out in any disease where a restraining influence on pyrexia and its attendant symptoms is desired. R. H. Quill ²_{July 20, '95} uses an ordinary surgical cradle or cradles, made somewhat broader than usual, with a tray attached to each. The tray is made of a light tin frame about fourteen inches long by ten broad, with sides two inches deep and pierced with a few holes; a floor for this frame is made by attaching to it a piece of flannel lined on its outside with oiled silk. The tray thus formed, having been lightly filled with ice in small lumps, is attached by means of tapes to the cradle, and suspended over the patient in such a way that, although the floor of the tray is in close apposition with the whole of the abdomen or chest-wall, as may be required, there is still no pressure or undue weight from its application.

There are certain questions which come up periodically for discussion, and among these is the treatment of pneumonia by large doses of digitalis. Since the communication of Petrescu, of Bucharest, several authors have lauded the marvelous effects of this treatment in acute pneumonia. A day will probably come, however, when some physician, doubly courageous, first in em-

ploying toxic doses of digitalis, and second in publishing several unfortunate cases of poisoning, will put the matter in its proper light. Lop, of Marseilles, ⁹²_{Dec. 10, '95} publishes four cases of pneumonia cured by the employment of from 5 to 10 grammes ($1\frac{1}{4}$ to $2\frac{1}{2}$ fluidrachms) of infusion of digitalis daily. He confesses that he did not feel warranted in employing the enormous doses advised by Petrescu (12 to 15 grammes— $3\frac{1}{4}$ to $3\frac{3}{4}$ fluidrachms—in twenty-four hours). In two patients there were some signs of intolerance, as vomiting and diarrhœa. Lop recommends that the physician watch carefully patients submitted to this treatment, seeing them at least twice a day. Nægeli-Akerblom ^{319 673}_{Aug. 10, '95 ; Oct., '95} regards digitalis as the most valuable agent in acute pneumonia when used in large doses. The drug, according to his investigations, causes hyperleucocytosis, both in man and in animals. He advises hydrotherapeutic measures in connection with the digitalis.

Franc ^{14 6}_{Sept. 18, '95 ; Sept. 28} strongly recommends the following plan of medication: The first day the administration of 0.001 to 0.002 gramme ($\frac{1}{64}$ to $\frac{1}{32}$ grain) of crystallized digitaline; the second day 0.001 gramme ($\frac{1}{64}$ grain) of the alkaloid is given, and if necessary the same dose is exhibited daily for a few more days. On the second or third day considerable improvement is stated to be observable, the disease appearing in some instances to be aborted. The happy effects of the digitaline are specially noticeable in infectious, adynamic types of pneumonia, where a manifest change for the better in the general condition is plainly observed on the second or third day in spite of the persistence of physical signs. It is claimed for the digitaline treatment that improvement is closely followed by rapid convalescence.

G. and J. Corin, of Liège, ²⁹³_{May, June, '95} praise digitoxine in the treatment of pneumonia. The latter prescribes 0.003 gramme ($\frac{1}{32}$ grain) of digitoxine, dissolved in the smallest possible quantity of chloroform and alcohol, and 200 grammes of water. This is taken in three doses six or eight hours apart. This is readily absorbed, and, in order to prevent vomiting, no food or drink is taken for one hour before and one hour after the dose is administered; the patient is made to lie perfectly flat for several minutes and a cold-water compress or a siphon douche used over the epigastrium. In patients with cardiac trouble especially he has given as much as 0.004 gramme ($\frac{1}{16}$ grain) daily, but has never exceeded that dose. This remedy, combined with an appropriate regimen, is the only one which he uses in the treatment of the disease. The patient, of course, is carefully watched, and the remedy suspended when the pulse becomes intermittent, which, at the latest, it will do within six hours, if at all.

Poulet, of Plancher-les-Mines, ²⁹⁶_{Nov. 20, '95} ²_{Dec. 23} has used hydrochlorate of pilocarpine in influenzal pneumonia with very good results. During an epidemic which prevailed in his neighborhood in February, 1895, and which attacked more than 1000 out of a population of from 3000 to 4000, he treated 108 cases, in which pneumonia and broncho-pneumonia were formidable complications, with pilocarpine, with only 4 deaths. He gave the drug in daily doses of 0.05 gramme ($\frac{7}{8}$ grain) except in the case of children, to whom a proportionally smaller amount was given. The treatment generally lasted two days, only in a few cases three days. The treatment was successful in several cases of old people over 70 years of age. It is to be noted that pilocarpine was by no means equally effective in pneumonia complicating whooping-cough in children. Ernest Glass ¹⁶⁹_{Oct., '95} also recommends pilocarpine and reports five cases in which its use was followed by good results. A. O. Stimpson, of Thompson, Pa., ¹⁹_{Oct. 5} is an advocate of muriate of pilocarpine to abort pneumonia.

Percy Kidd ¹⁵_{Sept., '94} supports the view of Habershon that the efficacy of alcohol is due to its action on the excito-motor nerve-apparatus of the heart and on the respiratory centre. The action of strychnine indirectly supports the view that what we have to fear is the influence of toxins on the nervous system. On this hypothesis cardiac failure is only an expression of exhaustion of the nerve-centres and an indirect result of the poison. It is best given hypodermatically directly into the gluteal muscles in doses of $\frac{1}{80}$ grain (0.0011 gramme), the indications for its use being derived from the pulse. If the tension begin to sink or if the frequency of the beats is much increased, it should be tried at once. Its good effect on the pulse and the respiration is often manifested in ten or fifteen minutes. When the rally is not maintained the above dose may be repeated every two hours until three or four doses have been given, and then once or twice in the twenty-four hours until the pulse and respiration right themselves. In the treatment of delirium strychnine often acts more beneficially than alcoholic stimulation. B. L. Craddock ¹⁸⁶_{Oct., '94} also advises the use of strychnine as a respiratory and cardiac stimulant in pneumonia in preference to alcohol, while K. R. Rone, of Auburn, Ky., ²²⁴_{June, '96} prefers it to all other drugs.

Larrousse, ²⁰⁰⁰_{Mar., '96} in treating alcoholic subjects, resorts to frequent hypodermatic injections of morphia, beginning with small doses; cold baths, regulated according to temperature, progress of the disease, and tolerance of the patient, and alcohol in small quantities during the day as the base of a tonic medication.

A. H. Kerr, of Pittsburgh, ¹⁶¹_{June, '96} regards creasote as almost a

specific, since it is antiputrescent, coagulates, and loosens mucus and pus, and thus favors free expectoration. It is largely eliminated by the lungs and air-passages, being thus brought directly in contact with the lesions. It is sedative, antipyretic, and volatile. He gives details of successful cases treated with the remedy, the following formula being employed:—

R Creasote, 3 fluidrachms (12 grammes).
 Sulphate of strychnia, $\frac{1}{4}$ grain (0.015 gramme).
 Alcohol, $\frac{1}{2}$ fluidounce (16 grammes).
 Glycerin, . . . enough to make 2 fluidounces (62 grammes).

M. Sig.: A teaspoonful in water every two hours.

Gaube, of Reims, ⁵⁷⁷_{June 30, '95} tried frictions with creasoted alcohol in pneumonia, finding that, while they did not cut short the disease, they lowered the temperature and rendered the patient comfortable. He believes that the frictions act reflexly on the nervous system, their action being inverse to that of the toxins secreted by the pathogenic microbe, in this instance the pneumococcus.

Authors have recommended great caution in the use of nitrite of amyl, urging that the dose of 5 or 6 drops should not be exceeded. Hayem ²²_{Oct. 23, '95} has made several experiments with the substance and proved that very much larger doses can be ordered with impunity; he gave more than once from 60 to 100 drops on a handkerchief to be inhaled at the one time, without observing any accident. He used it with good results in pneumonia. Fifteen drops were poured on a compress and inhaled in the recumbent position without effort; a few seconds afterward the same dose was renewed, and 15 drops more were given later on; so that in the space of five minutes about 50 drops were inhaled. The effects produced were those of nitrite of amyl,—redness of the face, acceleration of the pulse, precipitation of the respiratory movements. These phenomena soon gave place to a slight cough, a thready pulse, dyspnœa, lividity of the face, and cyanosis of the extremities and of the lips. In ordinary cases only one series of inhalations was given daily, while two (morning and evening) were ordered where the symptoms were grave.

F. Marot ¹¹⁵³_{June 8, '96} used chloride of methyl to calm the localized pain in the side in an exceedingly nervous patient suffering from pneumonia. The application was made along the course of the nerve and caused instant relief of the pain, and the moral effect on the patient was considerable, recovery rapidly taking place. The author then used the same remedy as a revulsive to hasten resolution, with good results.

G. Ivanov ⁷⁷⁰_{No. 4, '94} eulogizes the treatment of croupous pneumonia by the internal administration of camphor with antipyrin, his formula being as follows:—

R Pulverized camphor,	0.50 gramme ($7\frac{3}{4}$ grains).
Antipyrin,	2.00 grammes (31 grains).
Morphia hydrochlorate,	0.02 gramme ($\frac{1}{8}$ grain).
Sugar,	9.50 grammes ($2\frac{1}{2}$ drachms).

For one powder.

Sig.: To give one-fourth of the powder every one or two hours.

A case described by J. P. Philip, of Morpeth, ^{May 11, '96} illustrates the value of oxygen in the severe catarrhal pneumonia of children. Theodore Fisher, of Bristol, ^{Jan. 5, '96} and A. H. Frere, of Menston, Eng., ^{Jan. 12, '96} both call attention to the danger of the coal-tar series in pneumonia. As Holt ^{Sept., '94} says, antipyrin, phenacetin, and anti-febrin all reduce the temperature at the expense of a certain amount of cardiac energy, and for this reason they are dangerous in large doses and in small doses often useless.

D. M. Moir ^{Nov., '94} recommends chloride of calcium in full doses—10 to 30 grains (0.65 to 2 grammes), the smaller dose being repeated every two hours, the larger, if used, being given three times daily. It reduces the temperature and keeps it reduced.

Pleurisy.

Pathology.—Eichhorst ²¹⁴_{No. 13, '96} maintains that the majority of cases of pleurisy find their origin in tuberculosis of the bronchial glands. To illustrate the etiological rôle played by the bacilli he conducted a series of experiments on guinea-pigs, injecting into the abdominal cavity of the animals 1 cubic centimetre ($15\frac{1}{2}$ minims) of the exudate from every case of serous pleurisy. After six or eight weeks the animals were killed and their organs critically examined. Of the eleven animals inoculated only one developed glandular tuberculosis. As one animal, however, remained healthy after being inoculated with the serum of a patient who had pronounced pulmonary tuberculosis following shortly after an attack of acute pleurisy, the author concluded that the experiments were faulty in that he had not injected a sufficient quantity of the serum. A second series of experiments was, therefore, undertaken, the exudate being obtained from 23 patients who had been in good health when they acquired the pleurisy and in whom no tuberculous lesions could be detected after the most careful examination. In the later experiments 15 cubic centimetres ($3\frac{3}{4}$ fluidrachms) of the serous exudate were injected into each guinea-pig and, as a result, 15 of the 23 animals, or 65.2 per cent., developed tuberculosis, while only 8, or 34.8 per cent., remained healthy. These results indicate that nearly two-thirds of all cases of acute serous pleurisy are of a tuberculous nature.

Kr. Thue ³⁶⁹_{Mar., '96} has observed 35 cases of serous pleurisy and 23 cases of empyema during four years,—from 1890 to 1894. Of the former, 32 cases were without lung complications, and yet a large number of these patients showed unmistakable signs of

tuberculosis after a relatively short lapse of time. The author therefore concludes that a great percentage of the cases of serous pleurisy is due to tuberculosis, though a few are due to exposure to cold or some similar ordinary cause. The fluid was examined bacteriologically in 30 cases, the result being negative in 18 and microbes being found in 12. In 1 case the tubercle bacillus was present, in 9 cases various streptococci or staphylococci, and in 2, in which no microbes were found, inoculation of the fluid in a guinea-pig caused tuberculosis. Most of the cases of empyema were consecutive to pneumonia, and examination showed the presence of pneumococci in the exudate. (Report of Corresponding Editor Levison, Copenhagen.)

Of 16 cases of sero-fibrinous pleurisy observed by Séjournet, all had tubercular antecedents in the family, either in their direct ancestors or in collateral branches. All showed micropolyadenopathy, indicating a predisposition to tuberculosis. Their after-history demonstrated more completely than usual the tuberculous etiology of sero-fibrinous pleurisy. Of the 16 cases, 8 died of phthisis in from two to fourteen years after recovery from the effusion. One of them presented tuberculous epididymitis three years after the pleurisy and one year before becoming phthisical.

Lemoine, of Lille,¹⁴ Mar. 24, '96 who has also studied this subject, states that Fernet,¹⁴ p. 186, '96 after examining into the bacteriology of sero-fibrinous pleurisy, found few of these cases to be tuberculous, though he frequently noted pathogenic bacilli in the effusion. Lemoine made a bacteriological study of 32 cases of serous pleurisy, and in 28 found no microbe, either under the microscope, by cultures, or by inoculation. He found the staphylococcus albus four times. Of the 28 apparently sterile cases 16 were soon followed by evident tuberculosis. Seven recovered with some signs at the apex, and 5 appeared to end in complete recovery. Of the 4 in which staphylococci were found 1 was accompanied by suspicious signs of tuberculosis.

The connection between pleurisy and tuberculosis is referred to by Alexander James, of Edinburgh,³⁶ Sept., '96 who also believes that pleurisy may be the precedent, instead of the succedent of tubercular disease. Thus, he states, how often do we find that an individual who, at the age of 30 or 40 or 50 succumbs to tubercular phthisis, has informed us that five or ten, or a greater number of years before, he has suffered from one or several attacks of pleurisy? It is difficult to get precise data on this point, because, in the first place, it is difficult to follow up individual cases for the number of years required, and, secondly, because it is impossible in such individuals to be certain that the attacks of

pleurisy were not in reality secondary to tubercular lung disease which had either healed or remained latent for all those years. While admitting that in many of these instances the pleurisy has been secondary, he holds that in certain of them it has been the primary condition. Believing that in tubercular disease the soil is more important than the germ, he would interpret the occurrence of a pleurisy in such cases as indicating a lowered nutritive power in the respiratory and other tissues, which renders them specially vulnerable to the tubercle organism.

In the discussion Affleck expressed the belief that there was clinical and pathological evidence that pleurisy from being apparently simple might become tubercular. That pleurisy might be tubercular in its origin is known from the fact that it was often the starting-point of a general tuberculosis. The pleurisy might be an incident in an antecedent tuberculous process in the lung. All pleurisies occurring in young people, particularly in delicate young people, had to be viewed with great suspicion, for many of them were, he believed, tubercular,—probably primarily tubercular in the pleura. Leith, alluding to the question as to whether pleurisy occurring during the course of phthisis is tubercular or not, stated that there was no pathological evidence to show that it was tubercular. Neither were the pleurisies that occurred subsequently to a phthisis tubercular, but purely a tissue reaction of an inflammatory kind, which must be regarded as of a curative nature. There were two kinds. If a necrotic area, of caseous phthisis reached the pleura quickly it would cause a necrosis which was acute, and, like any other foreign body, set up an acute pleurisy spreading from that area. This process was very dangerous, because it was almost invariably followed by pneumothorax. The other form, which was a little more common, was that this cavity as it reached the surface, as it always tended to do, exuded an irritative toxin, which was rarely a tubercular toxin, and thus set up a chronic pleurisy which covered the surface and prevented pyopneumothorax. He thought chronic pleurisies during the course of phthisis were always of that nature.

Diagnosis.—Carmona y Valle, of Mexico, ⁷⁷June, '96 calls attention to a sign which consists in a modification of the voice perceived on auscultating the chest at the level of a pleuritic effusion when the patient speaks. The voice is not confused as in the normal state, but clear and more acute than the voice of the person who produced it, and it appears to come from a distance, though located within the chest; it is not vacillating nor tremulous, and this is what distinguishes the sign from ægophony. As in ægophony, the transmitting medium is liquid, and not air, as is the

case normally. Since he became acquainted with the telephone he believes that it resembles the timbre of the voice transmitted by that apparatus; hence he calls it the "telephonic voice."

P. Merklen¹¹⁵³_{Feb. 2, '95} has observed, as the characteristic signs of many cases of purulent diaphragmatic pleurisy, a dullness of the antero-inferior portion of the thorax, the upper boundary of this dullness forming a concave line inferiorly; a downward displacement of the liver if the affection be right-sided; a displacement of the heart to the right if the effusion be on the left side. Associated with the usual functional symptoms of the disease, these signs are of value in the diagnosis and in surgical intervention. A differential diagnosis between this affection and subphrenic abscess can be made from the manner of onset—diaphragmatic pleurisy beginning with pulmonary symptoms and subphrenic pyothorax with gastro-intestinal symptoms, as vomiting and diarrhœa—and, if necessary, by exploratory puncture.

M. H. Fussell, of Philadelphia,¹¹²_{Nov., '94} looks upon displacement of the heart as the most valuable physical sign of pleural effusions as distinguished from consolidation. Distension of the side and movable dullness are, of course, also valuable signs, but the chest may be so full or the effusion so bound down that it is immobile, while an effusion insufficient to cause distension will invariably cause more or less marked dislocation of the heart.

The characteristic, almost pathognomonic, feature of small effusions, according to H. B. Whitney, of Denver,⁵⁹_{Jan. 5, '95} is the curve of the upper boundary of flatness as determined by light percussion. The line, beginning at the spine, extends almost horizontally for a varying distance, usually to a point at or in front of the posterior axillary line, where it drops by a rather abrupt curve to the base of the thorax. The larger the effusion (within certain limits, as will presently appear), the wider the zone and the more anterior the drop. The latter may rarely reach the base as far forward as the apex of the heart.

During the many years since he first learned to look for this curve in small effusions he has become more and more impressed with its constancy and diagnostic significance. It is the only curve which he has ever found in small effusions, and has rarely found it in anything else.

In moderate effusions it is the curve of the upper boundary of the flat area which is the most characteristic sign of effusion. This so-called "letter-S" curve, to which attention was first called by Calvin Ellis in the later seventies, has not received the recognition it deserves. And yet we possess in this peculiar curve, in the author's opinion, a sign of moderate effusion which sur-

passes all others in value, which is quite distinctive, and which is rarely simulated by any other condition. Starting behind somewhere along the middle third of the dorsal spine, it extends first outward, then more and more abruptly upward, across the scapula to the region of the shoulder. It may, in some cases, be traced across the upper axillary region, or, if the effusion is somewhat greater, it will be lost in the shoulder or even slightly above it. Its characteristic feature is not so much its **S** form as the fact that it has its highest point in the axilla, dropping slightly, at least, toward the sternum and markedly toward the spine. This line may be readily obtained in all uncomplicated cases of moderate pleuritic effusion.

Bard ¹²⁶_{Oct. 15, '95} calls attention to the value of the antero-posterior wave in pleuritic effusions. This wave must be sought for with the hand at the base of the thorax, at the level of the costo-diaphragmatic sinus. If one hand only be used, short and rapid percussion must be made so as to obtain a trembling sensation. This latter is an early and very perceptible sign, giving useful information as to the state of the underlying lung, the degree of tension, and the mobility of the effusion. The antero-posterior wave indicates the upper limit of the effusion and the amount of fluid present, and also the pleural adhesions.

A test for distinguishing between serous exudations and simple transudations is given by Rivalta, ⁵⁸⁹_{Apr. 24, '95}, ²_{Aug. 31} who finds that, if a drop of glacial acetic acid be added to a serous exudate (that is, an inflammatory effusion), a slight white cloud forms in the wake of the falling drop, which precipitate redissolves on the addition of more acid. No such reaction takes place in mere transudation,—that is, non-inflammatory fluids. A good way of doing the test is to let fall a drop of the suspected fluid into 200 to 400 cubic centimetres ($3\frac{1}{4}$ to $6\frac{1}{2}$ fluidrachms) of distilled water, acidulated with two to four drops of glacial acetic acid. If the fluid be an inflammatory exudate a whitish streak follows the falling drop, and, on the addition of more acid, is dissolved. Examination of the precipitate shows that it belongs to the class of nucleo-albumins. The author's method presents a clinical advantage in that a mere drop or two of the fluid (such as can easily be withdrawn with an hypodermatic syringe) suffices to provide material for the test.

Atypical Cases.—Two cases of pleurisy with hæmorrhagic effusion are reported by G. Lipari. ⁴⁹⁷_{Jan., '95} The first patient was a woman, 24 years old, in whom the pleurisy was hæmorrhagic from the onset, recovery being complete. The second patient was a man, 61 years of age, suffering from diffuse atheroma, in whom

the pleurisy became hæmorrhagic at an advanced period and improved after puncture.

Mesnil²⁰⁰⁰_{'94} makes a contribution to the subject of so-called primary hæmorrhagic pleurisy, or pleural hæmatoma. According to him, simple pleural hæmatoma is only a primary tubercular hæmorrhagic pleurisy of a curable character, distinguishable from purely tuberculous hæmorrhagic pleurisy by the greater delay in the appearance of pulmonary tuberculosis. The prognosis is therefore to be regarded as more favorable, though it must be governed by the care with which the patient is surrounded and his manner of living. Any patient who has suffered from simple pleural hæmatoma not demonstrated as tubercular should be submitted to severe hygienic measures and close surveillance of the respiratory apparatus.

Stanley²_{No.1794,p.1144,'95} has reported the case of a woman, 30 years old, in which in an attack of pleurisy and pneumonia the temperature rose on two occasions to 114° F. (45.6° C.). At these times the patient complained of complete loss of sensation in the hands and feet and requested to have them rubbed. Absence of delirium was noted.

While purulent pleurisy has a tendency to open exteriorly or into the lung, in serous effusions of the pleura this is rare. Sahli,⁴_{Sept.10,'94} who reports two such cases, has been able to find only one other recorded in literature,—that of Corella.⁵⁰⁵_{No.68,'89}

Moty, of Lille,⁵⁷⁷_{May,'95} had under his care a man of 32 years, who, following right-sided pleurisy, presented simultaneously a fungous arthritis of the left knee and double tuberculous epididymitis. Resection of the knee was performed and hypodermatic injection of oil of creasote also given. Curiously enough, complete regression of the epididymitis took place.

Treatment.—De Cérenville, of Lausanne,²⁰⁷⁵_{p.323,'95} has suggested and carried out a new mode of treating dry pleurisy and pericarditis. He injects sterilized olive-oil where the presence of friction shows that the two serous surfaces are not working smoothly. The amount injected is from 1 to 3 cubic centimetres (15½ to 46 minims). The operation is said to be an easy one, which seems doubtful. It is also not painful. De Cérenville reports several cases of pleurisy and one of pericarditis so treated successfully.

Miron Ségalea, of Bucharest,³¹_{Dec.19,'94} employs guaiacol, using the following combination :—

R	Guaiacol,	.	.	.	.	.	3 grammes (46 minims).
	Glycerin,						
	Tinct. of iodine,	.	.	.	ââ	20 grammes (5 fluidrachms).	

M. Sig. : For external use.

The whole of the posterior portion of the thorax on the affected side is painted every twenty-four hours. In the interval the surface of the chest is covered with cotton-wool and gutta-percha tissue. Reaction is established in about four hours, being characterized by free perspiration, increase of urine, and, in febrile cases, a fall of temperature.

C. G. Cumston, of Boston, ⁹⁹_{Nov. 22, '95} believes that the so-called incurable cases of purulent pleurisy can usually be cured by the siphon, as recommended by Revilliod, of Geneva. The suction of the valve causes expansion of the lung, while the continuous aspiration renders washing out of the cavity less necessary.

Kemper ⁸¹_{No. 53, '95} recommends massage in pleurisy with or without effusion, using a series of movements for the thoracic cavity and combining these with movements of other parts of the body and special movements of inspiration.

Empyema.

[The bulk of the literature upon this subject published during the year being surgical, the reader is referred to vol. iii, A-1 to 14.]

Diagnosis.—In a fatal case of encysted internal empyema of the right lung in a boy of 4 years, Churton, of Leeds, ⁶_{Mar. 9, '95} states that the superficial dullness presented by the empyema during life did not much exceed half an inch; co-existing peritonitis, caseous mesenteric glands, and bronchitis in the opposite lung prevented this sign from receiving sufficient attention. The cavity of the external empyema was smooth and contracting. In a case observed by Schon ³⁷⁵_{No. 6, '95} clubbing of the fingers occurred as a transient symptom. The terminal phalanges were enlarged both from side to side and in the dorso-volar direction; the nails were abnormally convex, but their color was natural.

Atypical Cases.—In a case observed by M. Mackintosh, ⁶_{May 4, '95} in an infant 4 weeks old, there were no symptoms during life, the child appearing well and nursing normally. It was found dead in bed, and in a post-mortem examination the left pleural cavity was found full of pus and the lung was represented by a small, hard mass situated at the posterior part of the chest, which seemed never to have expanded at all. The amount of pus present was about eight ounces. It is a question as to whether the disease was present before birth or was a subsequent development.

T. S. Southworth, ⁵⁹_{Mar. 2, '95} in an autopsy on a child aged 7 months and ill for two weeks, found a cavity lined with pyogenic membrane, but otherwise dry, displacing the heart to the left, and about the size of an egg. Underneath the edge of the ribs a small

opening was seen in the anterior axillary line, situated close to the ribs, about half an inch in diameter. Inserting the finger into this opening, a cavity was revealed posteriorly which contained about one ounce of pus. There were a few areas of recent bronchopneumonia in the other lung. The interesting feature of this case was the fact that one of these empyemic cavities should be found entirely empty, while the other was nearly full of pus. If an incision had been made in the chest anteriorly during life, the child being in the recumbent position, little or no pus would have been evacuated.

Pulmonary Abscess.

O. J. Kauffmann, of Birmingham, ³²_{Oct., '94} describes two cases of pulmonary abscess simulating empyema. One of the patients was a boy suffering from suppuration of the mastoid cells and secondary abscesses in the lungs, from which complication he died. On removing the lungs there appeared to be on each side an empyema, limited from the general cavity of the pleura and much larger on the left than on the right side. These apparent cavities were very shallow and the lungs were almost in contact with the chest-walls. The most striking fact was that the apparent empyemas contained a small quantity of pus resembling that found in the cavities of the lung-abscesses, which were numerous. No communication could be found on either side between the empyemas and the lung or bronchi. The curious appearances in this case were elucidated by the second case, that of a child which died of suppurative periostitis of the femur and tibia complicated by acute pericarditis and suppuration, in the form of many small scattered foci in both lungs. There were no large cavities, and, as in the other case, a great number of abscesses were found lying close underneath the pleura. On removal of the lungs there appeared numerous patches of suppuration, apparently between the parietal and visceral layers of pleura, but none of the patches were more than half an inch in diameter. In every respect except size they resembled the apparent empyemas of the other case, but here their mode of origin was plain. It was clear that these small opened abscesses were identical with the large ones, simulating empyemas with only very scanty contents. In the small abscesses which retained their pleural covering, the latter was very thin, and not thickened as might be expected, the suppurative process having appeared to destroy the pleura in its deepest layers.

Wallace Anderson, of Glasgow, ²¹³_{Apr., '95} described the case of a patient with chronic abscess of the lung of unusual origin. There was a large cavity in the upper part of the left lung, extending

from close to the clavicle down to the third rib. This cavity, from time to time, became gradually filled up, when a severe fit of coughing would ensue, followed by the expectoration of a considerable quantity of fetid, purulent matter. To account for this cavity was the difficulty. He thought it was not likely to be tubercular. No bacilli had as yet been found, and the patient's strength had lost little, although the affection had now gone on for six years. There had, besides, been no persistent pyrexia and no sweatings. Wallace Anderson believed that the true explanation of the condition was to be found in the history of a supra-clavicular abscess, a blow upon which had been immediately followed by the expectoration of a considerable quantity of pus, as recorded in the appended extract summary of the case. This abscess appeared to have burst through both pleural layers, which might be supposed to have been previously affected by their proximity to the abscess. When the pus had thus found its way into the lung, the girl not being of robust constitution, there had probably been set up a process of necrosis.

Pneumothorax.

Etiology and Pathology.—Lapique ¹⁴_{May 29, '95} has ascertained by experiment on the dog that the amount of red corpuscles increases during pneumothorax. In a lung completely destroyed by the disease the number of red corpuscles went up progressively from 5,124,000 to 6,480,000.

Schlesinger ³_{June 19, '95} treated a woman who, after an attack of pneumonia, expectorated an enormous amount of fetid sputum and presented all the signs of partial left pneumothorax. At the end of several days this disappeared spontaneously. P. Muselier reports ⁵⁵_{Nov. 9, '95} a case of subphrenic double pneumothorax associated with generalized tubercular peritonitis. The cavity occupied by the fluids and the gas was immediately below the diaphragm, which formed the upper wall. He explains the case by supposing that a fissure existed permitting the issue of the intestinal gas, this fissure afterward becoming obliterated.

Paviot, of Lyons, ¹⁴_{Nov. 18, '94} observed a case of interstitial pleurog-enous pneumonia with seven foci of ulceration, one of which gave rise to fatal pneumothorax. There was no abscess nor gangrenous area, but true necrobiosis. The author, with Tripier, attributes the origin of ulcerations in chronic pneumonia to arterial obliteration; in fact, there was great endoperiarteritis in his case, the arteries and arterioles in the sclerosed portion being entirely obliterated.

Rodet and Nicolas ³_{Nov. 5, '94} report some interesting experimental

researches on pneumothorax. They found that the gas of experimental pneumothorax contains a considerable amount of CO_2 and a much smaller amount of oxygen than air. The change, moreover, is a very rapid one and results not from the influence of the air in the superficial alveoli, but directly from the blood.

Levy ²⁷³ _{B.35, H.4,5,'95; Jan., '96} ¹¹² reports a case, as rare as interesting, of spontaneous development of gas in a pleuritic exudate. The patient was a male, aged 48 years, previously healthy. During the course of two months he was aspirated five times for the relief of a large, recurring, serous, pleuritic exudate. A week following the last puncture there occurred marked signs of pneumothorax, which progressed. Aspiration was again resorted to, and, later, resection of a rib, on both occasions cultures being prepared from the exudate,—aërobic and anaërobic bacteria being sought for. Death occurred one month after the development of the pneumothorax. The autopsy revealed a caseous focus in the lung-apex, miliary tubercles on the peritoneum, nowhere any indication of a previous perforation into the pleuritic cavity. The bacteriological examination of the fluid in anaërobic culture revealed a thick, plump, immobile bacillus, which gave rise to a plentiful development of gas and was pathogenic for guinea-pigs. This bacillus was first described by Levy, who discovered it in a parametric gas-abscess, and was later investigated by Fränkel, who found it in four cases of gas-phlegmon. In the present case the supposition is that there first occurred a purely serous, probably tubercular, pleuritis, which at the end of two months suddenly changed to a pneumothorax, this change being due to the above-named bacillus; but how it effected its entrance into the system is inexplicable.

Pulmonary Gangrene.

Pathology.—V. Babès ³ _{Dec.18,'95} concludes, from his observations on the pathogeny of gangrene of the lung, that there is apparently no such primary condition. In cases of an epidemic character, in which the gangrene appeared to be primary, he always observed tonsillar alterations or retropharyngeal abscess. The infection occurred through the lymphatic glands, which were in an advanced state of gaseous sphacelus, gaining the pulmonary parenchyma and setting up diffuse gangrene. The author states that pneumonia is not necessary for the production of gangrene, as shown by histological examination; indeed, inflammatory exudate was absent in the alveoli. An important point, however, is that most cases are allied to putrid bronchitis. In the patients coming under his observation it was not acute fibrinous pneumonia, but pneumonia of a special kind that developed gangrene, a strepto-

coccus or staphylococcus of extraordinary virulence, capable of causing necrosis of the tissue, being associated with a saprogenous microbe, sometimes analogous to the coli bacillus and sometimes constituting a distinct species. He also met with two forms of bacteria capable of giving rise to pulmonary gangrene,—viz., a form of the bacillus of malign œdema and a special saprogenous microbe resembling the coli communis, but liquefying in gelatin and producing experimentally a progressive gangrene.

Treatment.—In all conditions characterized by great fœtor, dilatation of the bronchi, and pulmonary gangrene, etc., Rokitansky makes use ¹¹⁶_{p. 547, '96} of parenchymatous injections of antiseptic fluids. After carefully cleansing the thorax with some antiseptic he inserts the long needle of the Pravaz syringe, filled with a 3-per-cent. solution of carbolic acid, into the intercostal space where the physical signs are most marked, and slowly injects from 1 to 2 cubic centimetres ($15\frac{1}{2}$ to 31 minims) of the solution. Immediately after the patients have a taste of carbolic acid in the mouth, and an attack of coughing occurs, the less intense according as the injection was slowly made. The point of injection is covered with collodion and an ice-bag placed over it for some hours.

H. Richardière ¹⁷_{Aug. 10, '96} suggests the inhalation of vapor of guaiacol in pulmonary gangrene to overcome the terrible fœtor which is so pronounced a feature in many cases. The guaiacol acts also on the bronchial secretions, which are always abundant, and exerts locally on the gangrenous portion of lung an antiseptic and bactericidal action. He employs an ordinary oxygen-inhaler, placing the guaiacol in the washing-flask. The patients thus breathe oxygen which has bubbled through guaiacol and is impregnated with the vapors of this substance. Atmospheric air may be used instead of oxygen, but the latter often fulfills an important indication where a considerable portion of lung-tissue has been lost.

Plicque ⁵⁵_{Aug. 31, '96} uses the formula advised by Lop and Weil:—

R Sterilized oil of sweet almonds at 100°, 10 grammes ($2\frac{1}{2}$ drachms).
 Guaiacol, 1 gramme ($15\frac{1}{2}$ minims).
 From 0.19 to 0.40 gramme (3 to 6 minims) of guaiacol daily.

Bronchitis.

Pathology.—In the post-mortem examination of a case of primary membranous bronchitis Magniaux ²⁰⁰⁰_{'96} found generalized miliary tuberculosis in the pia mater, lungs, peritoneum, spleen, intestines, tracheo-bronchial glands, etc. The false membranes consisted of fibrin, with some leucocytes and epithelial cells. Bac-

teriological examination of the membranes, sputum, blood, and portions of the organs, and cultures and inoculations showed infection by an encapsulated diplobacillus, the bacillus of Friedländer, which the author believes to have been the cause of the bronchitis, the tuberculosis having only been secondary.

Hitzig ²⁰_{B. 141, 11.1, '96} observed, in the sputum of two cases of putrid bronchitis, two species of bacillus, one to two millimetres long, one transparent, the other opaque. The first had the characteristics of the coli bacillus and took the form of short, thick rods, or often of a diplobacillus. It did not liquefy in gelatin and gave rise to the production of gas when cultivated in bouillon, gelatin, and agar. It was pathogenic for guinea-pigs and rabbits, causing fibrinous suppuration and inflammation, followed by necrosis and rapid death. The second bacillus did not liquefy in gelatin; was pathogenic, in large doses, for mice and guinea-pigs, but was not virulent in medium-sized doses for the rabbit. Treatment by creasote led to marked improvement of both patients and especially modified the bad odor of the sputum.

Delacour ¹²⁷_{June 12, '96} demonstrates that the bronchial catarrh of old men, especially in charitable institutions, is generally the result of infection from want of cleanliness and overcrowding.

In the course of some clinical remarks on chronic bronchitis, A. G. Auld, of Glasgow, ⁶_{Dec. 28, '96} mentions a peculiar and, he believes, undescribed condition of the inflamed mucous membrane of the trachea and largest bronchi in certain severe cases. It is well known that, post-mortem, longitudinal bands or ridges are often found, giving the hypertrophied membrane, more especially over its posterior tracheal surface, a ribbed appearance. These ledges are formed chiefly of a granulation-like tissue, but very frequently quite a large amount of elastic tissue is likewise present. But in one or two cases he has detected quite large nerves traversing this tissue. In the normal membrane it is extremely difficult, even with the highest powers of the microscope, to trace the nerve-twigs. That comparatively large nerves, therefore, should be found in these ledge-like bands is a curious problem in pathology. Suffice it to say that they would very well serve to explain the excessive irritation which the cough betrays in these cases.

Henri Meunier, of Paris, ³⁶⁰_{July, '96} observed a case of triple phlegmasia and purulent pleurisy consecutive to chronic bronchitis with bronchiectasis. The phlegmasia was found at autopsy to be due to thrombosis of the arterial trunks of the lower extremities and the right arm,—the parts involved.

Dufloq ³⁶⁰_{Jan., '95} ²_{Jan. 19} relates the following cases: 1. A patient, aged 71 years, after a chill presented signs of disseminated bron-

chitis. Later the general condition became much worse, a fatal issue being feared. The urine contained a small quantity of sugar. On the eighth day abundant pneumococci were found in the sputum. The patient eventually improved slowly, and after a long convalescence recovered. The author says that this form of bronchitis always presents the same insidious onset, the same gravity, and the same slowness of convalescence. He has also found it present along with tuberculosis. 2. A patient took cold fourteen days after a fracture of the humerus. He developed a cough with abundant expectoration and only a slightly elevated temperature. Four weeks later he was wasted, the cough persisted, and the expectoration was profuse and ill-smelling. No tubercle bacilli could be found at any time in the sputum, but a bacillus was present which proved itself to be, both morphologically and by culture, the bacillus coli communis. The patient died some two or three weeks later. The author draws attention to the general symptoms in these cases, which somewhat resemble those of cholera. The prognosis is unfavorable. As to the cause of this localization of the micro-organism the author points to the gastro-intestinal dyspepsia which this patient occasionally suffered from. Bacteriological examinations are necessary in these cases of bronchitis.

J. R. Gibson, of Glasgow, ⁶_{Dec. 8, '94} observed general emphysema in a case of capillary bronchitis. The coughing had evidently caused compression of the air in the alveoli, and some of the vesicles had ruptured, the air then passing to the root of the lung, along the connective tissue, and from there up along the trachea and out to the subcutaneous tissue of the neck, from where it had spread to the regions mentioned.

Treatment.—Lancereaux ³⁵_{No. 27, '95} recommends the use of sodium hyposulphite in fetid bronchitis, in daily doses of 60 grains (4 grammes), which should not be surpassed, because of the likelihood of causing diarrhœa. This dose can be administered in syrup of eucalyptus or in a mucilaginous julep. It is also useful in cases of bronchial dilatation and in pulmonary gangrene. According to the same author, ¹⁰⁰_{Sept. 24, '96} ⁶⁷³_{Nov.} there is but one remedy which will calm the cough of herpetic individuals,—a cough occurring spasmodically and preceded by a tickling sensation in the throat. This remedy is sulphate of quinine in doses of 1½ to 2 grammes (23¼ to 31 grains) for adults and 0.40 to 0.75 gramme (6 to 12 grains) for children, taken in two or three doses half an hour apart. To obtain a satisfactory result it is essential that the patient feel buzzing in the ears, vertigo, headache, etc. This result is ordinarily apparent in three or four days, but the treat-

ment must be continued during the same space of time in order to prevent the return of the cough. Huchard,¹⁴ July 28, '96 to facilitate expectoration in chronic primary muco-membranous bronchitis, prescribes iodide of potassium in doses of 3 grammes (46 grains) per day.

In capillary bronchitis, or broncho-pneumonia, H. Morell, of Slayton, Minn.,¹⁰⁵ Sept. 1, '96 uses aromatic spirits of ammonia, generally injecting from 15 minims to 1 drachm (1 to 4 cubic centimetres) into the arm, according to the age of the child. It acts quicker and better and does away with all coaxing than if given by the mouth. Of course, it causes a smarting and burning sensation for a minute or so, but the child does not seem to mind it very much. The action of the drug is noticed almost immediately,—the face loses its livid color, becoming flushed; the pulse beats stronger, and respiration is deeper; in fact, all the symptoms are improved.

Gingeot³⁵ May 26, '96 states that to use, in the beginning of a case of acute or subacute bronchial catarrh, carbolized syrup, turpentine, eucalyptol, or even the classical balsam of Tolu, is not only to incur the risk of failure, but also that of aggravating the disease. These remedies are only indicated when the stage of decline is established,—a point already insisted on by Ferrand.

Régnier⁸⁷⁹ Dec., '96 recommends inhalations of ozone in the treatment of the chronic forms.

[In an editorial the *Boston Medical and Surgical Journal* (March 7, 1895) states that the present views becoming generally prevalent, relative to the microbian origin of even the common bronchial catarrhs, are doing much to influence the choice of remedies in these affections. It seems now most probable that the first step in the series of morbid changes resulting in bronchitis consists in a disorder of the vasomotor innervation, which causes congestion and places the organism in a state of lessened resistance; and just in those localities where microbes are normally present we see inflammations set in, of microbic origin, which are truly infectious, though non-specific. If this view be correct, remedies are to be sought which shall improve rather than lower vasomotor innervation, on which the inflammatory changes so much depend.]

Asthma.

Pathology.—G. Martyn² June 8, '96 saw a case of urticarial asthma due to mussel poisoning. The author reports this case as one which clearly indicates the relationship of urticarial eruption of the skin to that of the mucous membrane, which was so strongly advocated by Andrew Clark as the main cause of asthma. He

does not find instances on record of the concurrence of urticaria of the skin and of the mucous membrane as the result of a common cause.

Diagnosis.—Sajous, of Paris, ¹¹_{Sept., '95} at the meeting of the British Laryngological Association, called attention to the fact that infra-glottic disorders, growths, and syphilis especially gave rise to a form of dyspnœa simulating that of asthma. Iodide of potassium, so frequently prescribed in the latter disease, becomes, through its well-known tendency to cause local œdema, a dangerous remedy in cases in which the infra-glottic condition is overlooked. He therefore considers a careful examination of the larynx and of the infra-glottic space as clearly indicated in cases of asthma, especially in those in which iodide of potassium is about to be employed. In the discussion, Macintyre, of Glasgow, stated that the great majority of urgent cases of acute stenosis which he had been called upon to treat had occurred low down in the larynx, either in the region of the true or false vocal cords or below the glottis. Hill stated that anæsthetics are also dangerous in cases of infra-glottic thickening, and cited a case of laryngeal stenosis (the symptoms of which greatly resemble those of chronic asthma) in which death very nearly ensued through the use of ether.

Three prodromata of asthma are noted by Moncorgé, of Mont-Dore, ²²⁸_{Dec. 16, '95} as indicating the advent of the affection long before it would otherwise be suspected. These signs are: (1) the dyspnœic laugh; (2) repeated sneezing; (3) stridulous laryngitis. The laugh consists in a series of convulsive movements of the thorax and the abdomen, with intervals of more or less profound and noisy inspiration. It is frequent in the antecedent history of asthmatic patients, especially women. The repeated sneezing is of a special kind—spasmodic and occurring from some trifling cause, as change from cold to heat or the reverse, dust, bad air, fog, exposure to the sun, etc.—which would not affect a subject with normal reflexes or would only occasion a single sneeze. The two signs are frequently associated in the same patient. Asthma and stridulous laryngitis are two well-defined nosological entities, not to be confounded clinically, but Moncorgé has frequently noted stridulous laryngitis among patients who eventually became asthmatic. Both affections belong to the same nervous domain and are often hereditary; clinically they resemble each other by the suddenness of the attack, nearly always nocturnal and at the same hour, and by the habitual return to good health in the interval. A capital difference between them is that the one is essentially a respiratory dyspnœa, the other rather an expiratory dyspnœa. However, as is known, physiologically the pneumogastric may

produce either, according to the degree or point of irritation present; and nature repeats at will the experiments of the physiologist. As will be supposed, these signs appear only in predisposed patients of the nervous class called spasmodic. In them asthma is but a new form of spasm in the same sphere of innervation. It is desirable for the physician to know in advance the value of these signs.

Treatment.—Mays, of Philadelphia, ¹¹⁹_{Jan. 5, '95} obtains good results from the hypodermatic injection of a combination of strychnine sulphate $\frac{1}{20}$ grain (0.003 gramme) with atropine sulphate $\frac{1}{200}$ grain (0.0003 gramme), repeated daily or as necessary. In some cases this is re-enforced by giving $\frac{1}{20}$ grain (0.003 gramme) of strychnine four times a day with half a teaspoonful each of the syrups of hydriodic acid and of hypophosphites.

Thorowgood ⁹⁰_{Mar., '95} recommends iodide of ethyl, 6 or 8 drops being inhaled from a piece of lint in the palm of the hand. At the moment of the attack Tsakiris ¹⁰⁰_{Mar. 12, '95} sprays rapidly the back of the patient with chloride of methyl, from above downward and from below upward. The attack ceases in a few moments; if it does not, he lightly sprays the upper part of the chest. If the skin be delicate, as in women, he covers the parts with a bit of fine gauze, and makes the strength of the spray proportionate to the strength of the patient and the violence of the attack.

E. M. Skerritt ¹⁵_{Apr., '95} recommends citrate of caffeine, 2 grains (0.32 gramme), in cachet or dissolved in water, every four hours until bronchial spasm is relieved, "after which give at longer intervals, to prevent relapse. If attack comes on fairly regularly in the early morning, give 5 or 10 grains (0.32 or 0.65 gramme) at bedtime, repeating, if necessary, in the morning, as often as indicated." Asthmatics, according to Hare, of Philadelphia, ¹⁴⁴_{Dec., '94} endure large doses of iodide of potassium without showing any symptoms of iodism.

Marcet, of London, ⁶_{July 13, '95} in the Croonian Lectures, considered asthma as due in part to a deficient supply of oxygen to the respiratory centres, and advocates training of the respiration carried out by practicing the respiratory movements needed to carry the tidal air through lungs. Manipulation is recommended by Orrick Metcalfe, of New York. ⁵⁹_{Jan. 12, '95} The rubbing is never done superficially, confining the influence of the force expended to the skin; as the author practices manipulation there is pressure, combined with a very limited degree of rotary motion. The degree of pressure depends upon the sensitiveness of the part operated on and the nearness to the surface; where the tissues involved are deep-seated the pressure is necessarily firmer.



Description of Plate.

Diagnosis of Malignant pulmonary tumors by the sputum (Betschart)

Virchow's Archiv.

Malignant Tumors of the Lungs.

Diagnosis.—E. Betschart²⁰_{Oct. 3, '96} discusses the diagnosis of malignant pulmonary tumors by the sputum. While working in the laboratory of Eichhorst, in Zürich, he observed a case in which the diagnosis of primary diffuse cancer of the lung was made in this manner several weeks previous to death. He concludes that little reliance can be placed on the color, consistence, or form of the sputum in the diagnosis of pulmonary neoplasm. When, however, particles of a new growth in the lung find their way into one of the bronchi and are thus admitted into the sputum, which may occur when circumscribed nodules exist in the lung, sections of these masses would make a diagnosis easy. In diffuse carcinoma of the whole organ a diagnosis may be made from the presence of characteristic cells or groups of cells in the sputum, as in his own case.

Two cases of sarcoma of the lung are also noted in which a correct diagnosis during life was arrived at by section of tumor-particles found in the sputum, in each instance small, round-cell masses being discovered. Only one case had hitherto been recorded of a diagnosis of cancer of the lung by this method,—that of Hampler, who found, in gelatinous globular masses of sputum, large polygonal cells with granular protoplasm, the cells presenting a diameter of from 0.002 to 0.025 millimetre and their nuclei from 0.012 to 0.0125. Betschart asserts that these alone are sufficient to justify a diagnosis of cancer of the lung. These cells are shown in the plate.

Description of Plate.—Fig. 1. Fresh sputum, magnified 275 times. *a*, uninuclear, large, round cell; *b* and *b1*, round cells with several nuclei; *d*, red blood-corpuscles; *e*, free fat-globules; *f*, kernel cells; *m*, large cellular group.

Fig. 2. Fresh sputum, magnified 275 times. *m*, group of cells.

Fig. 3. Preparation of lung colored with borax-carmin solution, seen through microscope. *s*, carcinomatous tissue; *m*, lung tissue.

Fig. 4. Lung-tissue, magnified 275 times. *a* and *b*, alveoli filled with cells having one or several nuclei.

Cancer.—In a case of primary cancer of the lung, H. P. Loomis, of New York,⁵⁹_{Aug. 3, '96} made a thorough examination of every organ and tissue of the body to ascertain if there were any evidences of cancerous development in other parts. All the organs were found normal. Microscopical examination of sections taken from different portions of the neoplasm showed it to be a medullary cancer (*carcinoma molle*). The new growth seemed to spring from the epithelium of the mucous membrane of the bronchi. In some places an apparently pre-existing alveolar structure, as if the cancer-cells had filled the air-cells, could be made out. No pulmonary lesion was diagnosed during life. The man had been an

inmate of the almshouse on Blackwell's Island for a long time, and had died, as far as could be ascertained, rather suddenly. Leopold-Lévi, of Paris, ³⁶⁰_{Sept., '95} reports a case of primary bronchopulmonary cancer, with compression and thrombosis of the superior vena cava, hydrothorax, and cerebral ictus.

G. V. Poore, of London, ⁶_{Apr. 6, '95} records a case in which microscopical examination showed the neoplasm to be a round-celled sarcoma which was rapidly degenerating. Of great interest was the fact that it was practically impossible to establish a diagnosis in the early stages. The history was that of an acute onset, and the physical signs on admission were those of effusion into the left pleura. Even after the failure of aspiration, which necessarily aroused one's suspicion as to the true cause of the trouble, it was hard to believe that such failure was not due to some mechanical condition—such as profuse and œdematous adhesions—which prevented the flow of the fluid from the pleura. The physical signs were uniform in character, and there were no patches of dullness and resonance or of diminished and increased vocal fremitus, such as are common in growths in the lung. The necropsy, which revealed a soft, pultaceous tumor uniformly distending the visceral pleura, fully accounted for the physical signs during life. There was a history of very slight hæmoptysis, but this was never repeated and merely gave rise to the suspicion that there was tubercle as well as fluid. When toward the end there appeared marked œdema of the chest and marked distension of the veins on the left side of the face and chest, and this without any rise of temperature, the diagnosis became almost certain, the appearance of soft tumors on the neck of the humerus and one of the ribs further supporting the conclusions arrived at.

In a contribution to the clinical study of intra-thoracic tumors, William Pepper and Alfred Stengel, of Philadelphia, ⁴⁵¹_{Nov., '95} present the following conclusions: 1. The most frequent intra-thoracic tumor is sarcoma. 2. The most frequent point of origin is the anterior mediastinum, and, in particular, the remnant of the thymus gland. 3. Clinically, these growths may be grouped as those affecting the anterior mediastinum, in which physical signs are prominent; those of the middle and posterior mediastinum, in which the symptoms predominate over the physical signs, and those beginning in the pleura and in which both symptoms and physical signs are pronounced from the first. 4. In the diagnosis the important requisite is a careful consideration of the history of the case from the very beginning, with special attention to the progressive development of the symptoms and physical signs.

Foreign Bodies.

Kobler ⁵⁷_{Nov. 12-18, '95} ¹¹_{July} presents an extensive treatise on the subject of foreign bodies in the bronchi, and their consequences. The author concludes that, in the absence of pathological symptoms, experimental attempts at extraction are not indicated, but the patient must remain under medical observation. If pathological symptoms and consecutive disturbances arise and the foreign body be not expectorated, or, if it be mobile, so that it might occlude the glottis, tracheotomy, with subsequent emetics, or attempts at extraction, should be performed.

[These conclusions should not be considered in too broad a sense; the suddenness characterizing alarming symptoms in these cases warrants at least greater emphasis upon the "medical observation" than is advised by the author. Extreme watchfulness, indeed, is necessary.]

W. Moser, of Brooklyn, ⁵⁹_{July 13, '95} performed an autopsy, at St. Catharine's Hospital, on a child about 2 years of age, in which one-half of a pistachio-nut was found impacted in the left bronchus, completely occluding the opening from the trachea at the point of bifurcation. The nut was firmly impacted at this site and excited ulceration of the surrounding tissue. The author suggests that infants should not be given this variety of nut, which is light, smooth and slippery, and may easily, when the glottis is open, pass into either bronchus, in such places as circuses, theatres, etc., where laughter is indulged in.

In giving the history of a fatal case of tamarind-stone in the right bronchus A. B. Wade ⁶_{Dec. 14, '95} emphasizes the necessity of keeping open the tracheotomy wound until the body has been expelled. Post-mortem examination showed that the mucous membrane of the right bronchus was reddened and slightly softened, but that there was no ulceration. The diameter of the tube was markedly greater than that of the left, and the stone had evidently been impacted at about the middle of its length. The right pleura was obliterated, with soft, recent adhesions. The lung was large and completely solid. On section several points of pus appeared, which were the cut ends of bronchioles, the latter being distinctly dilated.

According to Purvis, the house-surgeon, the failure of the attempts at extraction was due to the softening of the stone, which prevented it from being distinguished from the walls of the bronchus on probing, and to the violent coughing, which absolutely prevented any delicate manipulation of instruments. There was also the doubt as to whether the foreign body was the stone itself or only the soft, tough husk, which would doubtless have been soon ejected, as it would not have swollen. It was easy to realize

afterward that it would have been impossible for the seed to have traveled up through the glottis, owing to its having swollen so much. The moral clearly is that the tracheal wound should never be allowed to heal while any chance remains of the foreign body being still in the chest, and that such a seed, though it may swell and soften, does not disintegrate even after fifty-three days.

Vasilin⁹⁰⁶_{Aug. 25, '95} reports two cases of broncholith in pulmonary tuberculosis in young women. The Koch bacillus was present in the sputum. The author recalls the work of Polaillon on this subject and the symptoms, bronchial or pulmonary colic or hæmoptysis, accompanying the expulsion of the small calculi. Létienne and Galippe³²⁷_{Feb. 14, '95} decalcified a pulmonary calculus in picric acid, and found, on staining with gentian-violet, the following micro-organisms: 1. A rectilinear bacillus with a tendency toward an arched or undulating form, in some instances tapering at one extremity and irregular in contour. 2. A coccus, sometimes in twos and sometimes in threes, with clearly-rounded grains, and not resembling the Talamon-Frænkel pneumococcus. Their results support the parasitic theory of calculi generally assigned.

A. J. Downes, of Philadelphia,¹⁹_{Nov. 10, '94} describes a case of pulmonary calculus in a woman, aged 89 years, who, while eating breakfast on Saturday, had a severe coughing spell. During the following few days she had several similar spells. On Thursday, about 4 P.M., he was present during the worst and last one. While listening to the chest during this attack he found no air entering the left lung. The attack ended with a copious discharge of muco-purulent matter, slightly blood-tinged, which, striking the basin, gave a sound. It contained the calculus, apparently too large to be cast up from the left bronchus, where it evidently had been. The patient has hardly coughed since, and has been entirely free from a bronchial irritation and expectoration from which she suffered for about fifteen years.

Francis Ruderow recalled the case of a negro, 42 years of age, admitted to the Episcopal Hospital with nephritis. He also had attacks of spasmodic asthma, and insisted that when the attacks came he felt a blocking in the region of the right bronchus. He suddenly died, and on autopsy a curious calcareous deposit was found in the left bronchus an inch and a quarter in length. This blocked the bronchus entirely and was undoubtedly the cause of death.

Hydatid Cyst of the Lung.

Vespa²_{Nov. 10, '94} relates a case of hydatid cyst of the lung in a boy aged 14, and remarks that the diagnosis in early stages is difficult,

but exploratory puncture may afford some information. The presence of hooklets or membrane in the expectoration or in the contents of the cavity is diagnostic. Hæmoptysis, frequently present, was absent in the case reported, while the localization of the disease and the general state of the patient with night-sweats, wasting, etc., pointed to tuberculosis. As to treatment, simple puncture has not been very encouraging; incision has given good results; it is indicated where the cyst is near the surface. Pneumotomy, with proper precautions, is not really dangerous, and has yielded good results in severe cases. Suppuration of the cyst is a further indication for incision. Good results were obtained in Vespa's case by the use of ether, 20 to 30 cubic centimetres (5 to 7½ fluidrachms) being given from an inhaler twice a day.

H. Lamarque, of Bordeaux,¹⁸⁸_{Dec. 16, '94} describes a similar case in which some of the membrane was also coughed up, the symptoms afterward improving. The patient seen by Kozarov, of Sliven,¹²¹¹_{No. 6, '96} coughed out two intact echinococcous cysts—one the size of a pigeon's egg, the other somewhat smaller—with pieces of ruptured bladders and a slimy liquid resembling white of egg. Without delay he prescribed an emetic with the result that the patient expelled a quantity of the fluid with membranes and cysts, after which all the symptoms vanished.

In the treatment of hydatid cysts of the lung opening into the pleura Troquart¹⁸⁸_{Dec., '95} states that abundant antiseptic irrigations of the pleura, sometimes dangerous on account of the presence of a pleuro-bronchial fistula, are, in general, useful. There should be free drainage in order to provide for the easy evacuation of pus. The attempt to prevent entrance of air into the pleura by aid of a tube-siphon is illusory. Spontaneous cure takes place more often than in purulent pleurisy without secondary resection of a rib. The rupture of hydatid cysts into the pleura does not constitute such a serious accident as has been thought, if the condition is recognized in time and treated in the manner indicated.

Pulmonary Actinomycosis.

In reporting a case of primary pulmonary actinomycosis, Aschoff, of Berlin,⁴_{No. 34-36, '95} draws attention to the fact that the infection was derived from a carious tooth, and that the disease had lasted over two years. The diagnosis lay between tuberculosis, echinococcus, and possibly malignant tumor. In his case an appreciable glandular swelling was not present, and the extension occurred by contiguity, while the urine showed the diazo-reaction. The author emphasizes the fact that the pus had a characteristic smell, which may, in all probability, have been caused by the acti-

nomycetes alone. The sputum is often flesh-colored or like black-berry-jelly, and may simulate that of tumor of the lung. He adds that in an early stage it might be possible, after resection of ribs, to scrape away the disease.

Heusser, of Davos, Switzerland, ⁴_{Nov. 25, '95}, ⁶_{Dec. 14} has recorded a case of primary actinomycosis of the lungs. In November, 1894, there was sent to him by Lichtheim, of Königsberg, a lady who had fallen ill in April with all the symptoms of acute pleurisy. She had been in hospital under the care of Lichtheim, and paracentesis was performed, by which 600 cubic centimetres (19 ounces) of serous fluid were drawn off, but the fever nevertheless continued. In the expectoration, which was scanty, no tubercle bacilli could be found. The patient was first sent home to the country, where she was expected to recover, and afterward to Davos. There a slight infiltration of the right upper lobe and a cavity in the right lower lobe were diagnosed. In the expectoration, however, to the surprise of the physician in charge, instead of Koch's bacilli, typical actinomycetes were discovered. Although at first the case seemed to be hopeless, the general state of the patient eventually improved.

Bérard, of Lyons, ²¹¹_{May 4, '95} observed a case in which severe actinomycosis of the lungs simulated advanced phthisis, and in which the diagnosis was made by examination of the sputum.

Anthracosis of the Lung.

Tripier, of Lyons, ⁶_{May 4, '95} combats the idea that anthracosis of the lung is in any sense a specific disease peculiar to miners, and advances arguments to prove that this condition is simply pulmonary tuberculosis modified by the special circumstances of the case. His view is that the phthisis of miners is simply of a tuberculous nature, but predominantly fibrous, in which the carbonaceous infiltration of the pulmonary tissue, especially as regards pathological products, may be so abundant as to cause the lungs to assume such a peculiar aspect as sometimes to render difficult of recognition the tuberculous lesions thus more or less concealed by the accumulation of the carbon. In one of his cases the patient had succumbed to "carbonaceous phthisis," and on post-mortem examination the lungs were found to be full of particles of carbon and much sclerosed, but further examination demonstrated the existence of a cavity at one apex and the presence of caseated tubercle. It is possible, of course, to argue that the tubercle was a secondary result of the infiltration of the lungs with particles of carbon. Tripier combats this view. In the case in point the patient had worked for fifteen years in mines without developing any pulmonary lesion, and had ceased from this occupation

for six years before showing signs of commencing disease of the lungs.

Leprosy of the Lung.

Riehl ³_{May 11, '95} relates a case of leprosy of the lung in which the bacilli of the disease were found at several different times in the sputum. Post-mortem examination revealed exudative pleurisy, an abscess the size of an egg involving the mediastinum, the vertebral column, and the lung, and diffuse inflammation of the bronchi. The abscess was not leprosy in character, but leprosy bacilli were found in the perichondrial tissue of the bronchi. On the other hand, they were absent from the pulmonary parenchyma. Besides these lesions there were several tuberculous cavities in the lungs, manifestly due to the Koch and not the Hansen bacillus. In the discussion Wintersteiner remarked that the patient had had some leprosy nodules on the eyelids and iritis with episcleritis of leprosy origin, the bacilli being found in the infiltrated tissue of the eye.

Distomum of the Lung.

De Gouvéa ²⁰⁰⁰_{Jan., '96} describes a case of pulmonary distoma. The author erroneously considers this case as the first reported in which the fluke has been found in this location. The patient was a naval officer of excellent health, who was suddenly attacked by chills and fever, the initial temperature being 39.6° C. (103.2° F.). Four days later he felt a painful spot at the base of the left lung, followed by cough and slight hæmoptysis. These attacks continued and the patient returned to France on sick-leave. With the exception of the painful spot the respiratory apparatus was in good condition, but at that point humid râles could be heard. On the eighteenth day from the onset of the affection the patient, after an attack of cough in the morning, saw among the expectorated blood a sort of yellowish leech wriggling. De Gouvéa had no trouble in recognizing it as an enormous distomum, two and one-half centimetres long. Leuckart, to whom he showed it, confirmed his opinion that it was an hepatic distomum.

Pulmonary Hypertrophic Osteo-arthropathy.

Davis, ⁶¹_{June 1, '95}, ²_{Oct. 12} in recording a case, and after reviewing the literature, does not consider this disease a pathological entity like acromegaly, but as a symptom-group often coincident with chronic lung affections, rarely with diseases of other organs and with syphilis. These give rise to a toxæmia, which, like that of phosphorus, arsenic, and certain infections, tends to involve bones and joints in inflammation. Davis's patient was a boy, aged 4½ years,

who had pneumonia at 1 year, and, since then, was never free from cough, with frequent and copious purulent expectoration. One year after the pneumonia the ends of the fingers and toes became deformed by enlargement, while the wrists and ankles increased greatly in size. There was no enlargement of the jaws; the lower lip was somewhat hypertrophied. The spine was straight. When exhibited there were signs of fluid (probably purulent) almost filling the left pleural cavity. There was no deformity of the bones of the body or enlargement of those of the upper arms. Both wrists were considerably broadened and thickened, but their movements were unaffected. The metacarpals were normal, the first phalanges of the fingers much enlarged, the second little affected, and the terminal set enormous and characteristically broadened and thickened. The nails resembled parrot-beaks. Similar changes were to be seen in the feet. The lower ends of the femora were much enlarged, but there was no fluid in the knee-joints. No joint-tenderness was observed. The urine and sputum had not been examined. Davis quotes the pathological observations which have been made by others on this disease, and emphasizes the points of diagnostic differentiation from acromegaly afforded by the disproportionate enlargement of the terminal phalanges in pulmonary hypertrophic osteo-arthropathy, together with the absence of deformity of the inferior maxilla. With regard to treatment, Moussous has observed improvement in one case after the drainage of the antecedent empyema, and Gillet after drainage of a tuberculous cavity. H. Schmidt found that a case of supposed syphilitic origin recovered after a course of specific treatment. Desmons and Binaud have recently observed considerable improvement in a patient treated by subcutaneous injection (during several months) of tissue-extract from the lungs of healthy sheep; Davis thinks this method deserving of further trial. He intended to treat his own case first by aspiration of the effusion, with thorough drainage of the pleural cavity should pus be found.

The following train of symptoms was observed by J. W. Springthorpe, of Melbourne, ²_{June 8, '95} in a male patient, aged 21, who presented a gouty and neurotic family history. The man had been perfectly healthy up to the age of 10, when he had an attack of right-sided pleurisy with effusion. The sequence of events in this case was as follows: An unrecognized empyema with adherent pericardium; extreme and permanent collapse of the lung, with consecutive dorsal curvature; finally, nutrition and development carried on under the double disadvantage of serious heart disease and impaired oxygenation of the blood. This rare manifestation of disease may be the result of exceptional abnormality of development

under the influence of continued and uncommon malooxygenation of the blood. Such an hypothesis would explain, to some extent, why certain portions of the long bones are especially affected. It explains the extreme clubbing of the fingers, the deformity at the lower ends of the radius, ulna, femur, phalanges, tibia, and fibula, and the changes in the skin.

Mediastinal Tumors.

Diagnosis.—Schadewaldt described a case which he had previously shown to the Laryngological Society of Berlin as aneurism of the aorta with paralysis of the recurrent, but which at the post-mortem examination proved to be a mediastinal carcinoma. In making a differential diagnosis between the two affections, it must be noted that paralysis of the recurrent, due to a mediastinal tumor, develops gradually. Hoarseness sets in, but again passes off, and a paresis can be demonstrated only after a considerable time. In aneurism the paralysis of the vocal cord is often the first symptom. Hæmorrhages are always an indication of the approaching end in aneurism, while in tumors there is not infrequently hæmoptysis at an earlier date.

Short showed to the Midland Medical Society ² Nov. 8, '94 specimens obtained from a mediastinal growth in a man 59 years of age. The early signs and symptoms were those of pleurisy on the left side, and blood-stained serum was drawn off. The pain, dyspnœa, and emaciation continued, and a thoracic growth was diagnosed. Three weeks before death he developed paraplegia from pressure on the cord at the level of the tenth dorsal vertebra. The mass, which was shown to be a mixed-celled sarcoma, had completely surrounded the aorta, œsophagus, and trachea, but had not constricted them to produce symptoms during life. The left lung was extensively infiltrated. Foxwell exhibited to the same society ² Mar. 16, '96 a man with a new growth originating in the posterior mediastinum, which had compressed the main bronchus of the right lung and also that supplying the lowest lobe. The superficial veins of the lower half of the thorax were dilated, especially on the left side, probably from pressure on the smaller azygos as it crossed the spine to join the larger. There was also a large mass of glands in the right supra-clavicular fossa. The first symptom of ill health was noticed at the end of November, 1894.

A. E. Sansom and F. Tresilian ² Apr. 27, '96 describe a case of malignant disease of the thoracic mediastinal glands, with dilatation of the descending aorta, marked cardiac intermission, and bradycardia. It is probable that the remarkable bradycardia and the grouped beats with the long pauses between were due to an irritant lesion

of the vagi, for the necropsy showed that these nerves in a portion of their course were surrounded by the malignant growth.

Cases of mediastinal tumor are reported by Litten, ³¹
Thiele ¹⁶⁴ ; William Krauss, of Memphis ⁷⁴ ; Drenkhahn, ¹¹⁶
^{Nov. 12, '94} ; ^{Nov., '95} ; ^{Oct., '95}
Karnik, ²⁰² and William Watson. ²¹³
^{Oct. 28, '96} ; ^{Feb., '96}

Treatment.—In a review of the subject of mediastinal tumors Millot Carpentier ⁹⁹⁶ states that medical treatment may lead to retrogression or, at least, the arrest of such growths when benign. Arsenic must be given the first rank, and iodide of potassium in increasing doses and for a long enough time to judge of its effects in doubtful cases, as syphilis is always to be thought of. Resection of the sternum may be proposed, though of doubtful value except as a last resort.

Peribronchial Adenopathies.

Pathology and Diagnosis.—A. F. Voelcker, of London, ¹⁵ points out that the importance of lesions resulting from the caseation and softening of the lymphatic glands situated around the lower end of the trachea and the main bronchi has hardly received that attention which both clinical and pathological investigations show it to merit.

The evidence derived from percussion has always seemed to him of doubtful value in a child as an indication of simply enlarged bronchial glands, for in small children the presence of the thymus gland insures a deficient resonance; but alterations in the breath-sounds are much more important, especially when they are unilateral. The most common alteration of breath-sounds in these cases is divided respiration, with prolonged expiration, unaccompanied by any adventitious sounds; but, as similar signs are produced by consolidation of the lung, from tubercular deposit, or from pneumonia, even the unilateral distribution of these signs cannot justify more than a suspicion that the glands are enlarged. There is, however, two not unimportant points to remember in dealing with pulmonary tuberculosis in small children, and they are that the disease in them nearly always affects both lungs, and that the mischief can often be traced from the hilum of the lung outward.

The next class of cases is that in which the enlarged glands actually invade the air-tubes and ulcerate through them. This may take place from tubercular infection of the walls of the air-tube by direct extension from a tubercular gland and the subsequent caseation and ulceration of the tubercular deposit, or it may be due to softening of the gland and erosion of the walls of the air-tube by pressure and inflammatory processes, or, lastly, it

may be due to the calcification of a caseous gland, with subsequent ulceration of the cretaceous nodule through the walls of the air-tube. That the condition is not rare is shown by the comparative frequency with which the evidence of ulceration is met with unexpectedly in the post-mortem room, and the author has seen over twelve such cases in autopsies he has made himself. Ulceration may take place into the œsophagus, though this is a rarer accident than rupture into the air-tubes.

In 1891 he collected, from the post-mortem records of the Hospital for Sick Children, 4 such cases out of 2500 post-mortem examinations; and since that time he has come across 4 other similar cases in children,—in 2 of these cases the gland ulcerated into the bronchus as well as into the œsophagus, and in the other 2 the œsophagus alone was affected. In these 2 latter cases there was no evidence during life of any œsophageal mischief.

Cases of ulceration into the left bronchus are rare. He describes one in which, at the post-mortem examination, anterior mediastinitis was found and a mass of caseous and softening glands was seen at the root of the right lung. These had perforated into the pericardium at its upper part, between the aorta and the right auricular appendix, by an opening five millimetres in diameter, and had set up general pericarditis.

It will be noticed that in many of the cases in which ulceration took place into a bronchus the breath had a very offensive odor, and, though this probably only indicates rapid death and decomposition of lung-tissue, we must bear in mind the relative frequency with which this condition is induced in children by the ulceration of bronchial glands into the air-passages. Hæmoptysis alone may accompany the ulceration into an air-tube, but the co-existence of fœtor of the breath with hæmoptysis and evidence of pulmonary consolidation should render us very suspicious of the bronchial glands as the source of the trouble. When the vomiting of blood and its passage by the bowel are added to these signs, the diagnosis of glands rupturing into the bronchus and œsophagus is, in a child, the most likely one.

Treatment.—When the condition is due to tuberculosis and kindred diatheses and is not complicated by fever or involvement of the lung-tissue, Marfan ¹¹³⁹ _{No. 6, '96} ²³ _{Dec.} states that children do the best when sent to the sea-shore or the country; but, if at the sea-side, they should not bathe in the sea and should be as quiet as is consistent with a life in the open air. Brisk friction of the skin should be employed with the towel, the dry hand, or with alcohol, the aim being to keep the skin in the best condition, as well as to bring about a reflex stimulation of the centres governing general

nutrition. Proper feeding is very important, and due regard should be had to the condition of the digestion. Marfan particularly values the iodotannic syrup of the French Pharmacopœia in the treatment of this condition, giving 2 teaspoonfuls per day to infants and twice that quantity to children over 3 years of age. This may be followed after three to four weeks by an emulsion of calcium lactophosphate and codliver-oil; this again, after about the same length of time, may give way to the previous medications. Still later, if the digestion permit, the arseniate of soda may be given. Counter-irritation between the shoulder-blades with iodine vesicants or the actual cautery has a favorable influence upon the glands. If the cough due to the pressure of the glands be severe and spasmodic, the tincture of belladonna will be of assistance. Inhalations of chloroform or ether may be cautiously used to combat violent dyspnœa of the suffocative type. When pulmonary tuberculosis is evidently present, resort should be had to the use of creasote or guaiacol, which the author gives preferably per rectum. When administering them hypodermatically, he adds a small amount of iodoform in the proportion of 1 to 10 of the creasote or guaiacol, dissolved in oil of sweet almonds, injecting it every second day. The formula is:—

R Guaiacol or creasote,	. . .	1.50 grammes (24 minims).
Iodoform,	. . .	0.05 gramme ($\frac{7}{8}$ grain).
Oil of sweet almonds,	. . .	10.00 grammes ($2\frac{1}{2}$ drachms).

From 1 to 3 cubic centimetres ($15\frac{1}{2}$ to 46 minims) of the mixture are injected, according to the age of the child.

Fever is favorably influenced by painting the skin with guaiacol. For a child of 4 years two applications may be made at 2 and 5 o'clock, over an area not larger than a silver dollar, lest collapse be produced.

DISEASES OF THE HEART AND BLOOD-VESSELS.

BY THE CENTRAL EDITORIAL STAFF.

SUBMITTED FOR COMMENTATION TO

E. N. WHITTIER, M.D., AND H. F. VICKERY, M.D.,

ASSOCIATE EDITORS,

BOSTON.

Hypertrophy and Dilatation.

Pathology.—James T. Whittaker, of Cincinnati, ⁴⁵¹_{Aug., '95} sums up a review of this subject by the statement that, from whatever cause it may occur, hypertrophy of the heart is differently interpreted by pathologists and clinicians. The latter consider it as a compensatory process, while pathologists, those of the modern school at least, do not look upon it as ever physiological, but always as an indication of disease. That Whittaker's criticism is supported by facts is prominently shown by the year's literature. Fortunately the question as to whether hypertrophy precedes dilatation as frequently as is generally believed has received considerable attention, and it may be said that the views expressed have all advanced our knowledge.

In the opinion of J. G. Adami, of Montreal, ²⁸²_{MAY, '95} hypertrophy is never primary and dilatation always precedes hypertrophy in a hard-working heart, whether the increased labor be due to resistance from within or from without or to nervous stimulation and augmented action. That this primary dilatation may really be a compensatory element in the case or a relief to the organ as a whole is made evident by the statement that the presence of residual blood incident upon the dilatation of the cavities diminishes the extent to which each fibre is called upon to contract.

This view is based upon serious experimental evidence. Hilton Fagge had recognized it as being probably the correct one. If, however, the heart-muscle is well nourished, hypertrophy ensues in accordance with Paget's law, and the numerical hypertrophy or hyperplasia of the ventricular muscle-fibre will, in turn, have the effect of lessening the load of each individual fibre. Consequently, with a lessened load each fibre will contract more

completely and the dilatation will tend to disappear. When this is the case we have simple hypertrophy.

James Stewart, of Montreal, ²⁸²_{Apr., '96} deals with the principal causes of cardiac hypertrophy other than disease of the valves and of the myocardium and adherent pericardium, and subdivides them as follows: 1. Organic changes in the arterial system, including obsolescence of the capillaries and also congenital narrowing of the arteries. 2. The overfilling of the circulation. 3. The circulation in the blood of either foreign substances or an excess of substances which are found normally in small quantities. 4. Causes that act in a manner still unknown on the general or cardiac nervous system. The diffuse form of arterio-sclerosis is rightly considered as, in many respects, the most important; the changes are wide-spread, affecting the whole arterial system to a greater or less extent. More than half of Councilman's cases were examples of the diffuse varieties, the youngest being a negro aged 23, the oldest a man aged 60 years.

Very interesting in this connection is a paper by W. Howship Dickinson ⁶_{July 20, Aug. 3, '96} giving the results of examinations of 139 vessels of all sizes, obtained from 49 individuals, mostly selected as the subjects of marked renal disease or as typical examples of perfect health. Sections of the arteries were carefully made in the same respective situations, placed under the microscope, and outlined on paper with the camera lucida and a uniform magnifying power of 6.35 diameters. Tracings were thus obtained and measured, both as to the thickness of the vessel-wall and the circumference of the artery. In the male series of cases the author shows that with the granular kidney the aorta is thicker than in health as 42 to 39, and thicker than with acute nephritis as 42 to 31. The innominate, with granular kidney, gives a thickness of 0.41 inch; that with health, 0.35 inch, and that of acute nephritis, 0.31 inch. The common femoral, with granular kidney, gives a thickness of 0.33 inch; with health, 0.26 inch; and with acute nephritis, 0.24 inch. The renal artery, with granular kidney, gives a thickness of 0.25 inch; in health and with acute nephritis, one of 0.18 inch. Both coats of the vessels are thickened. The circumference of the vessels is also increased with the granular condition of the kidney, that of the aorta giving $13\frac{3}{4}$ inches, as compared with $11\frac{3}{4}$ inches in health and $10\frac{3}{4}$ inches with acute nephritis. The innominate, femoral, and renal showed similar increase under the same circumstances. In the accompanying table the measurements apply not to the actual dimensions of the vessels, but to those of the representations uniformly magnified.

The author also found in the smaller arteries the condition of

thickening affecting both the muscular and fibrous coats. The total thickening and that of each coat are generally greater in the small vessels than in the larger. Finally, Dickinson states that in connection with the chronic granular kidney we have hypertrophy of the muscle and of the fibrous tissue belonging to the

STATE OF KIDNEY.		THICKNESS AND CIRCUMFERENCE OF ARTERIES. (Magnified 6.35 diameters. Mean measurements in inches.)											
		<i>Male Adults.</i>											
		AORTA.			INNOMINATE.			FEMORAL.			RENAL.		
	Number of Cases Observed.	Total Thickness.	Muscular Thickness.	Circumference.	Total Thickness.	Muscular Thickness.	Circumference.	Total Thickness.	Muscular Thickness.	Circumference.	Total Thickness.	Muscular Thickness.	Circumference.
Healthy	10	0.39	0.29	11¾	0.35	0.27	8¾	0.26	0.13	4¼	0.18	0.10	3
Acute nephritis; no cardio-muscular changes	2	0.31	0.26	10¾	0.30	0.22	7¼	0.24	0.14	4½	0.18	0.08	4
Large, white kidney	1	0.35	0.25	12	0.40	0.30	8	0.30	0.20	5			
Granular	16	0.42	0.31	13¾	0.41	0.29	8¾	0.33	0.21	6¼	0.25	0.14	3½
Lardaceous kidney	1	0.30	0.27	12	. .	. .	. .	0.35	0.25	5½			
Highly atheromatous aorta	1	0.57	0.38	15½	0.30	0.23	6½						
<i>Female Adults.</i>													
Healthy	8	0.34	0.26	11	0.26	0.24	7	0.24	0.15	4½	0.21	0.13	3
Granular, or white, contracting, kidney	7	0.38	0.30	12½	0.36	0.27	9	0.29	0.16	5	0.19	0.11	3½

whole arterial system connected with the left side of the heart and of the muscles of the heart itself. The connection between kidney disease and cardiac hypertrophy was studied by de Dominicis. ⁸⁴ Their association is attributable, in his opinion, to primary toxicity of the blood.

Lafleur²⁸²_{May, '96} gives statistics showing the proportion in which the various causes manifested themselves in 360 cases, representing the total number of autopsies from the opening of the Johns Hopkins Hospital, May, 1889, to April, 1893. Cardiac hypertrophy, due to some cause or other, was found to exist in no less than 105 cases. Of these arterial sclerosis was found to be the cause in 59 per cent.; chronic nephritis in 13.4 per cent.; valvular lesions, 12.4 per cent.; adhesions of the pericardium in 7.6 per cent.; excessive muscular work in 3.8 per cent.; tumors, 1.9 per cent.; aneurisms, 0.95 per cent.; hæmic plethora in 0.95 per cent. It becomes evident that more than 50 per cent. of the cases of cardiac hypertrophy in general hospital work were due to arterial disease.

Bollinger²²_{Aug. 23, '96} calls attention to the great frequency of heart disease in Munich, where it ranks third among the causes of death. He observed that after the ingestion of a pint of water during work by a strong girl, aged 22, the blood-pressure returned to the normal in the course of one hour, but after the ingestion of a pint of wine and water, or of a pint of beer, under the same conditions, the blood-pressure reached the normal only after two hours. Great beer-drinkers nearly all suffer in the course of a few years from dilatation of the heart.

Huchard, of Paris,³_{Nov. 3, '94} lays considerable stress upon defective and incomplete development of the thorax in the etiology of pseudohypertrophies of adolescence. The deformity is characteristic, and consists in an elongation of the thorax, with constriction of the antero-posterior diameter. The heart is forced downward and the apex is sometimes felt as low down as the fifth intercostal space, giving the illusion of a true hypertrophy. The præcordial shock is unusually energetic.

[We should not consider the presence of the apex in the fifth intercostal space in adolescents abnormal.—E. N. W. and H. F. V.]

Potain and Vaques, of Paris,³_{Sept. 25, '95} deny the pathogenic rôle ascribed by some authorities to ordinary growth in the production of various cardiac conditions, notably hypertrophy. Although rapid development favors unmistakably the appearance of functional cardiac troubles, especially cardiac irritability, a definite idiopathic hypertrophy cannot be demonstrated. Ordinary estimates of the normal cardiac volume in children have been mainly founded on anatomical researches without accurate clinical investigation.

Heart-fatigue and its results have recently received considerable attention, owing to the extensive use of the bicycle by people of all ages and conditions of health. In this, as in everything

else, immoderate use seems to represent the most potent factor in the untoward results to be expected. Sir Benjamin Ward Richardson, ³⁸_{3d Q., '94-'95} in an exhaustive article, states that the exercise of cycling tells primarily and distinctively on the heart and circulation. In this it differs from many other exercises, such as rowing, climbing, and long pedestrian feats. In all cyclists, at all ages, in riders who are practiced in the art, as well as in riders who are neither practiced nor extreme in the work, there is, in the beginning of each attempt, a quickened circulation, although there may be no consciousness of the phenomenon. The pulse at the same time is full and bounding, and there is the further fact that throughout the ride there is a continued rapidity, not amounting to the same degree as at first, but, if the pace be even moderate, rarely falling under the hundred pulsations per minute. The pulse-reading, as indicated by the sphygmograph, often takes a distinct form. The impulse-stroke is lengthened; the recoil is longer and the angle is sharper than normal; the third event, from closure of the aortic valves (the dicrotic crest), is usually sharply marked, and, as is necessary, owing to the rapidity, the strokes are near together.

In cycling, so long as the exercise is continued, an increase of cardiac motion is observable, the act of movement on the machine seeming sufficient to keep the circulation in its vigorous and now more equal tension. The author thinks this may account for the astounding journeys which the fully trained cyclist can undertake, when he is in his prime, and also for his endurance without sleep. In spite, however, of this quickened motion of the heart, he has never known any rider so embarrassed by cardiac overaction as to cause him to stop in order to dismount and rest, and he has never known one grow giddy or describe symptoms of angina or other indications of cardiac embarrassment. Indeed, a good and practiced rider can climb a hill without difficulty and yet might be unable to mount a flight of stairs without breathlessness and palpitation.

Teissier, of Lyons, ¹⁴_{Dec. 19, '94} examined ten runners who had just reached the goal. The apex of the heart seemed to have deviated to the left two or three centimetres. In one runner affected with aortic insufficiency, and who came in second without fatigue, the apex was lowered, and, as a consequence of this deviation, the base remaining fixed, a notable increase of the præcordial dullness was observed. This increase was evidently connected with a dilatation of the right cavities, as was shown by the deviation of the apex and by the results of auscultation. The cardiographic outlines collected showed the brevity of the systole and its sharpness;

the characteristics of the beating of the forced heart described by Pitres were found. Among all the men the arterial pressure was lowered at least six centimetres. The mechanism of this phenomenon, according to Teissier, seems to relate to overtaking, to general fatigue, and to secreted toxic products. There is a certain degree of muscular overexcitability which appears to be due to toxic products accumulated in the blood. There is a slight, but constant, diminution of faradic excitability and an increase of galvanic contractility; the patellar reflex always disappears. In two-thirds of the subjects examined there was appreciable albuminuria with an increase of the proportion of urea.

Félix Ramond¹⁴_{Dec. 8, '06} observed segmentary dissociation of the myocardium in a fatal case of strained heart. The patient, a runner by profession, after having finished a rapid run of thirty kilometres in about four hours, died with all the symptoms of subacute asystole. Microscopical examination of the heart disclosed the undeniable lesions of segmentary dissociation; the intercellular continuity of fibre seemed to have been broken. There was, besides, a considerable interstitial hæmorrhage, which no doubt contributed to the dissociation, and a quantity of small fatty granulations in the body of the cell. With this exception the cell and the nucleus did not present any other degenerative lesion. The absence of diapedesis and of recent or old fibrous tissue excluded all possibility of myocarditis. The lesion was rather mechanical, the fibre being torn by the action of the systole and the diastole of the interstitial hæmorrhage; but, in order that this should occur, the fibre must have lost its normal resistance and elasticity through a dystrophic process of its protoplasm. Mendelsohn, of Berlin,²²_{Jan. 15, '06} has noted that the pulse, after violent use of the bicycle, had in some cases reached 250, and that after ten hours' rest the heart was still accelerated,—a sign of beginning insufficiency.

[Deaths while bicycling were by no means few during the year, judging from the reports of the lay press. The few instances reported in the medical press seemed, however, to point to some diseased condition of the circulatory system as the main factor. Post-mortem evidence not being furnished, however, the information conveyed does not warrant more than a mere recognition of this fact as far as bicycling goes. Heart-strain due to other causes may, however, afford a certain degree of relative information.]

Banti⁸⁵⁴_{B. 6, Nov. 14, 15, '06} studied the heart of several subjects in which death had occurred from this cause. He found marked dilatation of the coronary veins and their subepicardial branches. Micro-

scopically this dilatation was seen to extend to the capillaries between individual muscle-bundles. The intermuscular connective tissue was also found to have undergone a change, having become granular and cloudy. Some of the muscle-cells showed vacuolar degeneration. Venous congestion and œdema of the muscular bundles and connective tissue represented the gross pathological features observed.

Diagnosis.—T. Stacey Wilson, of Birmingham, ³²_{Sept., '94} contributes a comparative study of dilatation as presented in adolescents and adults. Excessive work thrown upon the normal right ventricle during excessive athletics or labor presents a fairly distinctive symptom,—namely, pain localized in the region of the second and third left costal cartilages. This pain is usually dull, but it may be acute; it is accompanied by a sense of tightness in the præcordia. Dyspnœa and palpitation, with displacement of the apex-beat upward and outward, are often sufficient to establish a diagnosis of dilatation of the right ventricle. These points are timely in connection with excessive cycling.

In the adolescent type of dilatation Stacey Wilson states that the increase in size is upward and to the left, giving an increased area of relative cardiac dullness in the third, second, and sometimes in the first left interspaces. In the adult type there is usually some increase of cardiac dullness to the right of the sternum, though it is usually less than the upward increase. Inspection and palpation show cardiac pulsation in the second and third left interspaces, and this pulsation is not powerful like the apex-beat or an aneurism, but has a characteristic wavy appearance. We must depend on relative dullness, obtained by percussing the heart while the chest is held in position of full expiration. In adolescent cases the dullness to the left of the sternum is usually increased when the patient lies down. In these cases the area of relative dullness increases upward to the second interspace and broadens outward and downward to the fourth interspace until in advanced cases the left edge of the dullness almost coincides with the left ventricle. The superficial cardiac dullness broadens and extends upward. It rarely extends to the right of the sternum. Auscultation gives (1) the well-known pulmonary systolic murmur, usually heard best in the second left interspace; (2) accentuation of pulmonary second sound, occasionally true reduplication of the second sound at the base of the heart; (3) the venous hum so well known in cases of anæmia; (4) the murmur due to tricuspid regurgitation; (5) a false reduplication of the second sound, audible only over the ventricle and constituting one of the varieties of *bruit de galop*; (6) more rarely still a tricuspid diastolic

murmur: of these murmurs the pulmonary systolic is the most common, and is of considerable diagnostic value in the dilatation which occurs as a result of overstrain with or without anæmia in adolescence. (See "Valvular Disorders.")

Treatment.—F. W. Campbell, of Montreal, ²⁸²June, '96 after carefully reviewing the subject in the preparation of a report to be presented to the Montreal Medico-Chirurgical Society, reached the conclusion that, after all, the treatment of cardiac hypertrophy is much the same in all cases, regardless of cause. The majority of authors hold that we are not able to control the nourishment of the organ. The signs which were considered as indicating such control have been proved to be misleading and fallacious. Thus the impulse may be reduced in force and extent, the first sound changed in its character and the area of cardiac dullness lessened. Notwithstanding all these signs, the hypertrophy remains the same, and the apparent diminution has been brought about by disorgement of the right cavities. The views of the various leading therapeutists are quoted. Walsh and Page are in accord as to the great value of aconite—1 drop every two hours until its effects are manifest; Page deprecates digitalis, recommended by Walsh and Osler as a cardiac stimulant, when valvular trouble is present, broken compensation being the signal for its use. The latter authors are also in accord regarding the value of blood-letting, Osler emphasizing the fact that with signs of dilatation—as indicated by gallop rhythm, urgent dyspnœa, and slight lividity—venesection is, in many cases, the only means by which the life of the patient may be saved; 20 to 30 ounces (630 to 930 cubic centimetres) of blood should be abstracted without delay. Strümpell practically advises the same remedies as Osler. When compensation has been established, Strümpell recommends baths ranging from 90° to 93° F. (32.2° to 33.9° C.), which are well borne by the patients and exercise a peculiarly beneficial and invigorating influence upon the heart. This cumulated evidence as regards the main features of treatment represents the portion of the measures advocated worth presenting. Campbell states that he has used, with excellent results, pellets of cactina,—the active principle of *Cactus Mexicana*,—each containing $\frac{1}{100}$ grain (0.00065 gramme), 1 pellet being given every two hours during the day. It is especially effective in weak and dilated heart. Kola cordial is recommended as a cardiac tonic.

Blackader ²⁸²June, '96 thinks that attention has not been sufficiently called to the necessity of recognizing and treating the earliest condition, in which there is a pure hypertrophy of the heart-muscle. He groups the cases into two classes: (1) those in which the chief

trouble, for the time being, lies in overaction of the heart-muscle; (2) those in which the principal difficulty is undue contraction of the arterioles. To meet these conditions he recommends two drugs which, properly employed, give efficient assistance. The first is aconite, which acts directly on the heart, lessening its force and frequency, and has comparatively little action on the vascular system. The second is a solution of either sodium nitrite or nitroglycerin. Both of these act directly upon the small arterial vessels and have almost no action upon the heart; by them arterial tension can be lessened. If good results are, however, to be obtained, it is necessary to secure a steady action of the drug, with due regard to the time required for its elimination. Aconite is eliminated comparatively slowly, and, in order to maintain an even action, it should be administered about every six hours. With the nitrites it is different; they are eliminated rapidly, and to maintain their action in the vessels the dose should be repeated at least every three hours. The ordinary routine method of administering these drugs three times a day is, in his opinion, defective, and is likely to prove useless in most cases.

Hermann Rieder, of Munich,³²⁶
B. 55, p. 8 advises the following method of treating cases of dilatation and hypertrophy resulting from over-exertion: In marked cases rest in bed is an important factor; if it is not insisted upon the pulse becomes more rapid, weaker, and perhaps irregular, and the patient is exposed to heart-failure. Stimulants, such as brandy, wine, ether, etc., tend to irritate the organ. Digitalis is very useful in many cases, but is rejected by some stomachs, giving rise to spasms of vomiting or increasing the danger. In such cases rectal injections of the drugs that may be indicated are followed by marked results. The use of strophanthus preparations and the ordinary medicinal cardiac stimulants in addition to digitalis may be employed in the same manner as in other forms of cardiac disease. Calomel has afforded the author great service after the other cardiac remedies had failed. Narcotics and hypnotics are to be used only with great care, but are sometimes necessary. Since the hypnotics, through the production of sleep, rest the heart, they are in so far to be commended. Ice-bags are of doubtful value. Blood-letting, for relief of the vascular system, preventing the stasis and decreasing the resistance to the emptying of the left ventricle, is to be recommended, and has produced good results when used by the author, especially for the temporary relief of cyanosis and distressing dyspnoea. The use of aerated beverages is to be avoided not only on account of their excitant action on the heart, but also owing to the increased arterial pressure produced by the contraction of the capillaries.

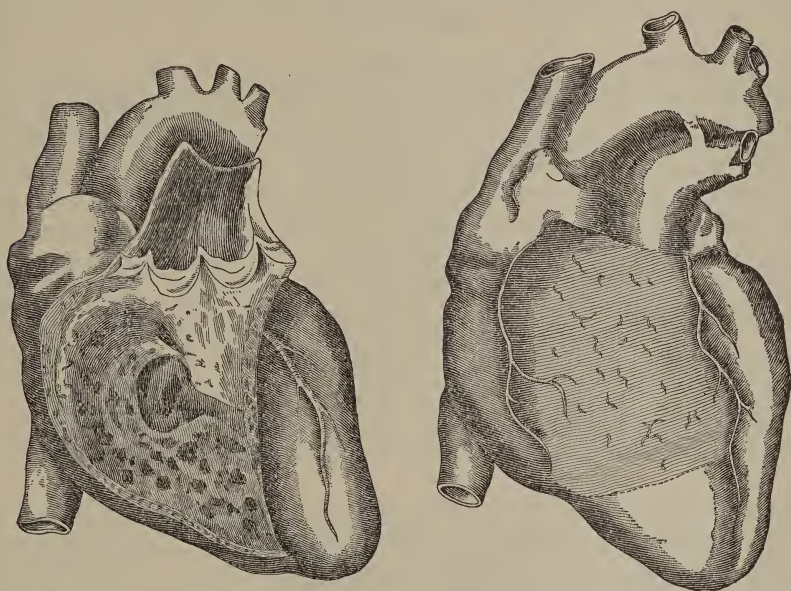
Myocarditis.

Etiology and Pathology.—It is generally believed that the cardiac contractions begin at the auricles. This fact led Rada-sewsky¹¹⁴_{B.27,II.5,6} to regard it as quite probable that, in certain cases of irregular rhythm, the changes took place in the muscle-walls of the auricles, and not in those of the ventricles. This opinion was supported by the fact that, in some cases of myocarditis affecting the ventricular septum, no arrhythmia of the pulse could be observed. The results of careful pathological examination of the cardiac muscle in six cases of heart disease are given as further evidence. The author, therefore, concludes that, besides the disseminated localized indurative myocarditis there is also a diffuse fibrous degeneration of the cardiac muscle, to which hitherto but little attention has been paid, and that this diffuse fibrous degeneration is frequently much more marked in the walls of the auricles than in those of the ventricles. When extensive diffuse fibrous degeneration of the muscle of the auricle occurs, with or without disease of the ventricular muscle, the heart's action is irregular; but when only slight changes occur in the auricular muscle, with or without extensive changes in the ventricular muscle, the heart's action is regular. He calls attention to the important point that, in chronic myocarditis, the marked irregularity of the heart's action cannot be explained by ventricular disease, and that it may in all probability be due to disease of the auricles. A case reported by Stoicesco and Babès, of Bucharest,⁷³_{Dec.7,'95} is interesting in this connection, owing to the location of the active pathological process in the upper part of the ventricle, especially in the region of the infundibulum pulmonare, as shown in the cuts, but also because its etiology was unusual. The local process was tubercular and had suddenly become acute, through the intervention of another, but undetermined, infectious process.

Aufrecht,³²⁶_{B.54,II.6,'95} calls attention to a form of heart affection which, he thinks, has not received sufficient notice,—viz., that due to alcohol. He believes that alcoholic drinks in any form may lead to myocarditis when they are used in excessive quantity. With regard to the clinical features of the disease, it affects men usually of middle age,—between 25 and 50,—and frequently those engaged in breweries and the liquor trade. It proceeds very gradually, and the majority of patients are well nourished and corpulent. The first complaint is of shortness of breath; sometimes pressure in the præcordia is experienced. Attacks of dyspnœa are more rare, and examination reveals an increase in the heart-dullness. This, according to Aufrecht, is due to dilatation, which, he says, precedes hypertrophy. In what manner

alcohol leads to primary dilatation of the heart is not very clear.

A. Brault,⁷ Nov. 23, '94 in an article on myocarditis with small, circumscribed areas of fatty degeneration in the cardiac segments, describes two such cases, the lesion not being generalized throughout the entire myocardium, but in rather regular areas of about equal dimensions. The vessels played no part in the affection, as they were intact, and the disintegration in no way resembled that of infarct. The dissemination of the foci of degeneration, on the contrary, indicated an intoxication producing simultaneous effects. At each point the lesions appeared to be recent and con-



MYOCARDITIS LOCALIZED AT UPPER PART OF VENTRICLE. (STOICESCO AND BABÈS.)
Le Progrès Médical.

temporaneous, the connective tissue not being hypertrophied or involved. It is presumed by the author that the disintegration is of the same class as the endocarditis accompanying septicæmia.

Treatment.—Roger,¹¹⁵³ July 20, '95 speaking of acute myocarditis, states that the treatment is easily determined by clinical study; medications which are capable of restoring the energy of the heart should be used. Digitalis, except perhaps in pneumonia, is absolutely insufficient; caffeine should be used, and, as usually the symptoms are urgent, the subcutaneous method should be resorted to. An injection of from 0.25 to 0.40 gramme (3½ to 6 grains) of caffeine should be given morning and evening. If the pressure

weaken (and Potain has seen it fall to 13 and even to 6 centimetres), subcutaneous injections of ergotine should be prescribed.

It was formerly considered that the existence of myocarditis was a contra-indication for cold baths. To-day the contrary opinion prevails. It is necessary, however, to be extremely cautious and to begin with baths of 28° C. (82° F.), then, progressively, baths of 26° and 24° C. (78° and 74° F.) may be given, and finally they may be as low as 20° or 18° C. (68° or 64° F.) While the symptoms remain serious the baths should be given every three hours, but they should never last longer than ten minutes.

Endocarditis.

Pathology.—Michaelis, of Berlin, ³_{May 29, '05} showed the heart of a dog which had succumbed to acute ulcerative endocarditis, produced by the injection of pneumococci. For a period of four months the animal had received injections of progressively increasing doses of a culture of pneumococci. After the last injection the animal became ill and died. The autopsy showed lesions of acute ulcerative endocarditis such as is observed in man. The aortic valves were covered with ulcerations and one of the mitral valves was perforated. Signs of interstitial myocarditis were also recognizable. In the deposits covering the valves, numerous pneumococci were found, and the blood of the heart formed a pure culture of the latter. These pneumococci, cultivated in bouillon and injected into other animals, killed them in fourteen hours.

E. Dessy ³⁷⁶_{No. 4, '94} examined 22 cases of endocarditis, both bacteriologically and histologically, and found in 8 the diplococcus lanceolatus capsulatus (three varieties), in 7 the streptococcus pyogenes, in 1 the staphylococcus pyogenes aureus, in 1 the diplococcus lanceolatus together with the staphylococcus pyogenes albus, and in 3 the streptococcus pyogenes together with the staphylococcus pyogenes aureus.

Leyden, of Berlin, ⁶⁹_{Dec. 6, '94} suggests that the fatal cases of rheumatic endocarditis may also be examples of a mixed infection. Although acute rheumatism is looked upon as an infective disease, bacteriological investigation has as yet only given uncertain results. In 4 of the author's 6 cases of acute rheumatism in which death occurred somewhat early, a diplococcus was found in the vegetations differing from other micro-organisms, such as the staphylococcus, pneumococcus, etc., and which Günther considers as a special one not hitherto described. In 2 of these cases there was ulcerative and in 3 a vegetative or verrucous endocarditis.

In the remaining case there were extensive foci, both cellular and fibrous, in the myocardium, the valves being intact.

Lloyd and Riesman⁵_{Feb., '96} relate a case of infectious endocarditis and septicæmia in which there was extensive multiple neuritis with muscular atrophy. In general appearance the case resembled one of typhoid fever. Post-mortem examination showed very extensive soft vegetations on the aortic valves. The microscopical examination of nerve-trunks showed the existence of marked perineuritis. There was some evidence of degeneration in the posterior columns of the cord. The authors admit the possibility of the neuritis being due to alcohol, and discuss the nature of the infection, which was not attended by the formation of pus in any part.

Thos. B. Flint⁶_{Sept. 28, '96} gives an account of a case of ulcerative endocarditis associated with coarctation of the aorta. The author remarked that the case reported was especially interesting on account of the association of these two disorders. The case bore a close resemblance to pulmonary phthisis, the temperature, down in the morning and up in the evening, being very suggestive of this; but, of course, there was the presence of the valve-lesion to account for it. The patient had never had rheumatic fever or chorea, nor had he suffered from any other serious ailment previously. He had never undergone severe physical exertion, and his work had always been light. Achard³¹_{Nov. 28, '94} observed a fatal case exhibiting purpura and latent peritonitis and vegetative endocarditis grafted upon chronic valvular disease of the aortic orifice.

Tuberculous Form.—Endocardial lesions due to tuberculosis are, according to Teissier,⁷³³_{Feb. 8, '95}⁶_{Feb. 23} multiple in form and complex in pathology, the tubercle bacilli, toxins, and associated bacteria, all combining to produce the disease. The bacillus acts locally by producing a specific lesion, and generally by its deteriorating effect on nutrition. The specific lesion showing itself as granular or caseating nodules is rare, being less frequent than tuberculous pericarditis. It is always a secondary lesion due to presence of bacilli in the circulation, and does not cause any characteristic cardiac signs. The sclerosing form is frequent and the result of slow tuberculous infection. It occurs in the course of chronic tuberculous cases, and shows itself by producing harsh cardiac murmurs. Many of the cases of valvular disease in scrofulous subjects are thought to be influenced by the presence of tuberculous toxins. An acute form due to secondary infection is also described by the author, which appears to tally by its clinical course with infective endocarditis. It may, like infective endocarditis, take a vegetative

or an ulcerative form, but more work has yet to be done before accurate conclusions can be drawn. Biondi⁸⁵⁴ has examined cardiac vegetations of various diseased areas from eleven cases of tuberculosis. Some of the growths were made up of an homogeneous material or of slightly granular masses intersected by fibrin-fibrils. Sometimes spaces were seen filled with red and white blood-cells. In some instances there were large cells at the base of the vegetation, but in no case was the structure like that of tubercle. The bacteriological examination never revealed any tubercle bacilli, either at the periphery or in the centre of the vegetation. In three cases cocci were found. Thus the vegetation consisted of a hyaline thrombus more or less converted into new tissue. Any idea of a tuberculosis of the endocardium could not be entertained.

C. Giraudeau, of Paris, ³_{Oct. 10, '94} while recognizing the fact that in consumptives, vegetative endocarditis, in the majority of cases, is not referable to the tuberculosis, but to a superadded infection, and while recognizing that it is as cachectic and not as tuberculous subjects that the patients are attacked by vegetative endocarditis near the end of their lives, he, nevertheless, asserts that in certain cases the bacillus of tuberculosis should be considered as responsible for the production of the endocarditis, and that, with the naked eye, nothing enables one to say whether it is a case of endocarditis caused by superadded infection or of true vegetative, tuberculous endocarditis. Only a bacteriological examination and, above all, experimentation can remove all doubts.

Syphilitic Form.—In a case reported by Israel⁴_{Sept. 9, '95} a systolic murmur was heard in the left second and third intercostal spaces, with an accentuated second sound. There was no clinical evidence of syphilis. Eight days after admission there was a profuse and fatal hæmorrhage from the stomach. In the discussion Klemperer pointed out that this was apparently the first case in which an endocarditis was demonstrated to be of syphilitic origin, and that the diagnosis of such a lesion was now within possibility, for gummatous formations in the heart-muscle were found, while the liver showed marked fibrous changes with remains of gummata.

A case of syphilitic endocarditis causing mitral-valve insufficiency is reported by Charles O'Donovan, of Baltimore.¹⁰⁴_{June 22, '95} No marked improvement followed any treatment until the patient was given the iodides, when he began at once to receive benefit. The course of improvement is so very like recovery from some syphilitic nervous lesion that the striking analogy renders the diagnosis almost certain.

Gonorrhœal Form.—Winterberg, of San Francisco,²⁰⁰¹_{July, '95} de-

scribes the case of a man, 25 years old, who, in the course of an attack of specific urethritis, complicated by right-sided epididymitis and enlargement of the glands in the groin, was seized with a chill followed by fever and general malaise, together with swelling of both elbow-joints. Cyanosis and dyspnoea set in, and speech became difficult and the sensorium obscured. There was general dullness on percussion of the chest, and moist râles were heard on auscultation, together with loud, blowing systolic and diastolic murmurs over the heart, especially in the aortic and pulmonary areas. The knees and ankles also became slightly swollen. The liver and spleen were enlarged; the stools contained blood and the urine albumin. Death took place amid the signs of exhaustion. Microscopical examination of fragments of the cardiac valves disclosed the presence of gonococci. The heart was enlarged and the myocardium, which presented a grayish appearance, contained numerous purulent foci. The aortic and pulmonary leaflets were almost entirely absent, and replaced by friable caseous remains.

Finger¹³_{Dec.1,'95} found three characteristic varieties of the gonococcus in the vegetations of this affection: (a) an endocellular variety in the regions in which the gonococcus comes in contact with numerous leucocytes; (b) a cumulative variety, resembling the cover-glass products of a true culture and situated in the large cavities of the vegetation, and (c) a variety characterized by its tendency to form long, asymmetrical rows analogous to those found between epithelial cells in the thin interstices of vegetations.

Fœtal Form.—Wm. P. Northrup, of New York,⁵¹_{Sept., '94} describes a case of early fœtal endocarditis constricting the conus arteriosus, all the other changes being obviously due to nature's effort to compensate. The endocarditis must have developed early, before the septum was completed, so that nature could select the very best point to effect a compensating circulation. Since the right ventricle could not discharge all its blood into the lung-artery, it was allowed to hypertrophy, force as much as possible through a narrowed pulmonary orifice, and pour the remainder over into the high-pressure stream of the left ventricle, discharging into the systemic circulation. How well this heart succeeded in overcoming the embarrassment will be understood when it is noted that it did its work for four and one-half years, carried the patient through measles and whooping-cough, and was overwhelmed by an abscess of the brain and repeated convulsions.

A case of fœtal endocarditis of the right heart is reported by Zariquiey, of Barcelona,¹¹⁸_{Nov., '94} and a case associated with an arrest of development of the interventricular septum, by T. C. Railton, of London.⁶_{Aug.10,'95}

Diagnosis and Prognosis.—Ewald¹⁴_{July 14, '96} reported the case of a young man who was attacked with severe rheumatic fever. Auscultation revealed a loud diastolic murmur, filling all the orifices, but more intense at the apex. In the præcordial region, in the third and fourth intercostal spaces, at the edge of the sternum, there could be felt by the hand a pronounced friction-sensation which seemed to indicate a pericarditis. The patient succumbed after three days, and at the autopsy no other cardiac lesion could be found except an ulcerative endocarditis.

Boisson, of Val de Grâce,³⁵_{Mar. 16, '95} cites a case in which death occurred from reflex pulmonary congestion while the lesions were still in the primary stage. The condition of the valves, as shown by the autopsy, accounting for no insufficiency, the author concludes that a modification of the timbre of the cardiac note and a valvular snapping sound, which were features of the case, may be considered as the diagnostic signs of pre-organic acute endocarditis.

As regards the distinction between the benign and malignant form, William Pepper and Alfred Stengel¹¹²_{May, '95} state that the careful pathological and bacteriological work of recent years has shown that there is no sharp dividing-line by which the benign cases can be separated from the malignant; and the coincident increase in our knowledge of the clinical features of these important diseases has similarly shown that in this direction also there is no separating line.

Handford,²_{Dec. 1, '94} speaking of the malignant variety, states that the diagnostic value of murmurs in endocarditis is generally over-estimated and their significance often misinterpreted. A great many of the systolic apex-murmurs arising during the course of acute rheumatism or other febrile diseases, which were generally considered to be sufficient evidence of endocarditis, are really due to dilatation of the left ventricle and of the fibrous ring at the auriculo-ventricular opening. This was especially true of those murmurs which disappeared early in convalescence.

George Dock, of Ann Arbor, Mich.,⁹⁹_{Nov. 1, '95} describes three cases to emphasize the importance of careful differential diagnosis and guarded prognosis in those obscure forms of endocarditis which simulate malarial fever. In one of these a malignant endocarditis affecting the mitral valve and the left auricle developed post-partum. The author then saw the case and diagnosed malignant endocarditis due to puerperal affection, probably assisted by an old symptomless lesion of the mitral. A loud, grating, systolic murmur, louder over the apex, was heard all over the thorax, in the axilla, and over the back; a second, soft, systolic murmur was

heard along the edge of the sternum. The temperature-record showed remission or even a continued type at first, then a pure intermittent fever. The patient died and the autopsy confirmed the diagnosis. Masses of vegetations were found on the mitral and aortic valves and over the endocardium, while large numbers of streptococci were seen on microscopical examination.

Daniel Critzman, of Paris, ¹⁶⁴_{Oct. 11, '94} considers the prognosis of lesions of the endocardium in childhood as favorable, the asystole in these cases being transitory and leaving no bad effects.

According to Leyden, of Berlin, ⁶⁹_{Dec. 6, '94} rheumatic endocarditis is rarely directly fatal, and then only in a late stage, when the presence of micro-organisms is hardly to be expected.

Treatment.—In 300 cases of acute and subacute rheumatism, Caton, of Liverpool, ⁶_{Mar. 9, Aug. 17, '95} observed cardiac complications in 51 cases. Thirteen of the cases received no special treatment beyond that appropriate to the rheumatism and were kept in hospital, on an average, for twenty-five days; of these, 12 left the hospital with a bruit and 1 without. Thirty-eight cases were treated by repeated blistering over the cardiac region and by the administration of potassium iodide; treatment was continued for an average of forty-one days; of this latter number 28 left the hospital without any bruit and 10 with a bruit. William Russell, of Edinburgh, ⁶_{Aug. 31, '95} extols the measures recommended by Caton,—*i.e.*, blistering over the præcordia and iodide of potassium internally.

In the so-called “malignant endocarditis” Dreschfeld, of Manchester, ²_{Dec. 21, '95} states that cases presenting the typical signs seem to be most benefited by large doses of quinine with arsenic.

Tyson, of Philadelphia, ⁹_{Feb. 16, '95} says that treatment avails little. The patient should be kept at rest. Remedies should be restorative and supporting,—quinine, stimulants, and digitalis. Nourishing food is indicated. The high temperature may be treated by sponging, or by an ice-cap, or by Leiter's coils applied to the thorax or abdomen; but it is seldom of so long duration as to require special treatment.

Valvular Disorders.

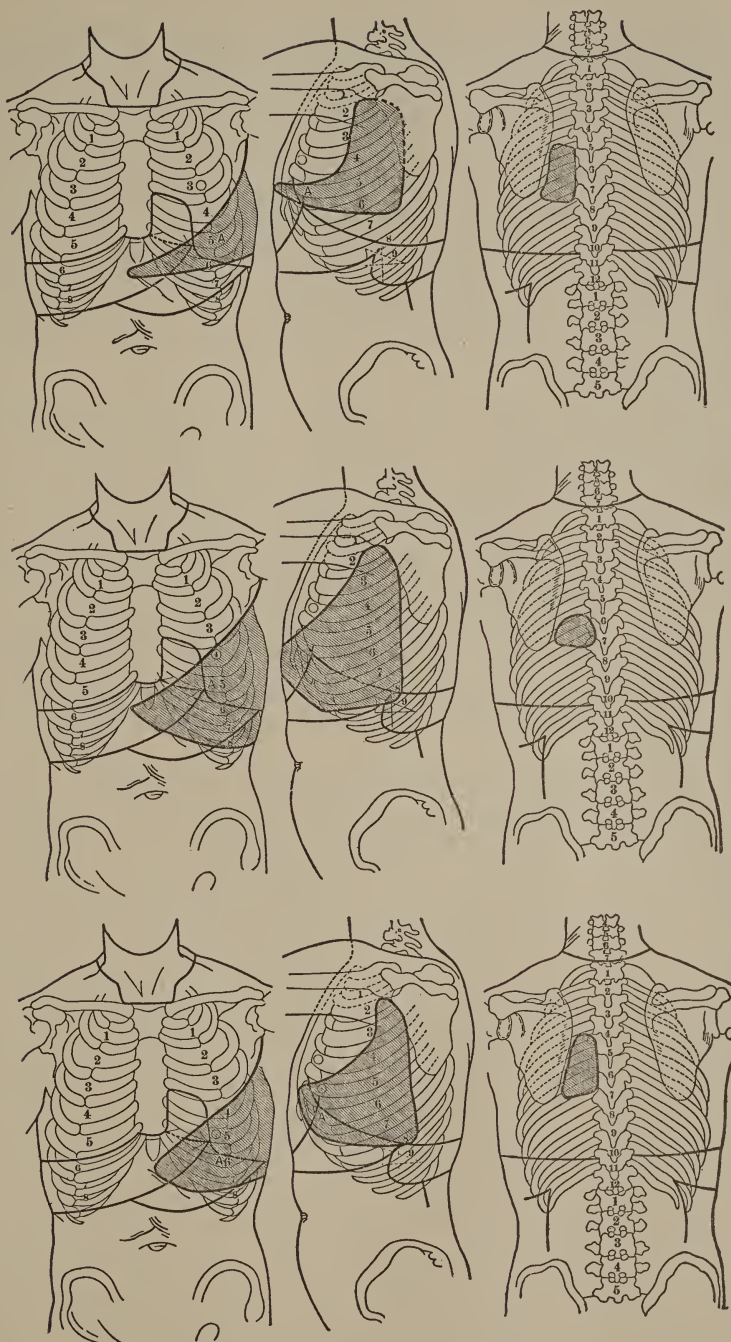
General Considerations.—E. Weisz ¹¹³_{No. 52, '94} studied the subject of compensation in heart disease in 130 cases of valvular diseases, 46 of which died while under observation. In by far the larger number of fatal cases, 66 per cent., there was an insufficiency of the aortic valves which was present in only 33 per cent. of those recovering. Insufficiency of the bicuspid valve, on the other hand, was present in only 15 per cent. of those who died. Insufficiency of the aortic valves can exist for years without causing any

symptom, and in most cases only a few months intervened between the first symptoms and death. In insufficiency of the bicuspid valve, however, the symptoms usually extend over many years. This seems to show that the affections of the left venous ostium and the bicuspid valve cause complaints much earlier than stenosis and insufficiency of the aortic valves, but in the latter death takes place much sooner after the first pathological symptoms than in the former. This does not mean, however, that the prognosis in affections of the valves of the aorta is less favorable, since most of the patients grow old, but it is the difference between the stages of compensatory and non-compensatory action in these various affections to which attention is thus called. In insufficiency of the bicuspid valve there is a certain direct relation between the stage of compensatory and non-compensatory action, which latter seems to set in very soon, though patients may withstand even the severest symptoms.

It has been supposed that the stronger left heart can keep up the compensatory action longer than the weaker right heart, since the force of the left chamber is almost three times as great as that of the right. It seems, however, that under normal circumstances the right heart is not weaker than the left, but that its mechanism is much less favorable, and for this reason it stops work sooner than the more favorably constructed left heart.

At the German Congress for Internal Medicine, Zahn, ²⁰⁰⁶_{Apr. 3, '06} of Geneva, read an article on certain anatomical conditions in valvular insufficiency in which he stated that in some cases, in which a clinical examination indicated valvular insufficiency and in which at the autopsy insufficiency is not demonstrable by the water-test, there will frequently be noticed slight thickenings at the level of the valve and upon their free edge, as well as upon the corresponding wall of the ventricle. Their shape is nearly concentric, the concave side facing the auriculo-ventricular orifice. These thickened areas correspond with the spots struck by the blood-current in the ventricle, the impact of which determines a circumscribed atrophy of the muscular fibres and a corresponding hypertrophy of the connective tissue. Below the valves a similar condition is found, the convexity of the concentric spots being turned toward the orifice in conformity with the direction of the blood-current. These lesions, which have been reported by only a few authors in cases of overaction of the heart following pleurisy, frequently exist in the conditions mentioned above, in subjects attacked by diseases such as deforming endarteritis, pericardial adhesions, or Basedow's disease.

Mitral Stenosis.—J. P. Crozer Griffith, of Philadelphia, ⁵_{Sept., '06}



DIFFUSED MURMUR-AREAS IN MITRAL STENOSIS. (GRIFFITH.)

American Journal of the Medical Sciences.

states that the region in which the murmur of mitral stenosis is ordinarily heard is well known, and is generally described as limited sharply to the mitral area or its immediate vicinity. Through several years past the author has met with a comparatively large number of cases of this disease, and has had the conviction more and more impressed upon him that the murmur, although usually confined to the region of the apex, is not at all infrequently heard much beyond the ordinarily prescribed limits. In these cases the murmur has oftenest occupied the mitral area, and has extended thence in a narrow, tongue-shaped band upward and to the left into the axilla. In other cases it was audible in an area much greater than this.

That the extensive area of audibility of the murmur is more frequently present than is supposed, even by those who have admitted its possibility, is indicated by the fact that the 7 cases described by him had all been met with within three months. In 3 of them the murmur was audible in the back; in 1 it extended two and one-half inches beyond the left posterior axillary line; in 4 it reached the posterior axillary line, and in 2 the mid-axillary line. In all it was quite audible very high in the axilla. The diagrams on preceding page show three cases in different positions, demonstrating to what degree the general teaching regarding the area in which the murmur may be heard may be departed from.

Graham Steell ⁹⁰_{Sept., '95; Jan., '96} analyzed 60 cases (41 female, 19 male) of mitral stenosis from the point of view of physical investigation; 17 died, and the post-mortem records are given. The results are compared with a table published by the author in 1888 as the outcome of his clinical experience. Of changes in the natural sounds of the heart, accentuation of the pulmonary second is unimportant, since it is common to all forms of cardiac disease; accentuation of the first and reduplication of the second sound in the mitral area are, however, both common signs, each occurring in about two-thirds of the cases. Absence of the second sound from the mitral area is, however, comparatively rare. With regard to murmurs, the apical presystolic was only present in just over half the cases, while a diastolic could be heard in four-fifths; this latter was more frequently audible both at the apex and above than at the apex alone. In three-fourths of the cases an apical systolic murmur was present, often not conducted round to the back; in 83 per cent. there was a systolic murmur in the pulmonary area, in 68 per cent. in the tricuspid region. Steell lays especial stress on the very great frequency of diastolic murmurs in mitral stenosis; no satisfactory theory of their origin has

as yet been put forward. The heart in this disease is much enlarged transversely, the right auricle being, of course, increased, but the left ventricle also gaining to an extent more in accordance with clinical experience than with *a priori* reasoning. There is no pathognomonic pulse in mitral stenosis, though three stages can be roughly distinguished according to the successive conditions of tension and regularity through which it passes.

Two cases described by Adami, of Montreal, ²⁸²_{Apr., '96} presented, apart from other points of interest, the history of well-marked presystolic murmur associated with the diametrically opposite conditions of extreme stenosis and of dilatation of the mitral orifice. In the one case the stream of blood pouring through from the left auricle into the ventricle at the end of ventricular diastole, judging from the aperture shown in the specimen, must have been peculiarly fine and have passed through with considerable force; in the other there must have been a large stream passing slowly. In the former the wall of the auricle was distinctly of a muscular type; in the latter the muscle was thinned and weakened. The edges of the mitral orifice in the case of stenosis were smooth, in that of the dilatation were slightly roughened. The two cases tended to show therefore that the presystolic murmur is not dependent upon the absolute size of the orifice, and he suggests that with such extremes it cannot be dependent even on the relative size. They show also that the condition of the edges of the orifice through which the stream of blood pours must only play a secondary part; and, in short, if we accept the view that the presystolic murmur is auricular systolic, due to the pouring of blood into the ventricle in consequence of the contractions of the auricle, they make it extremely difficult to assign a cause for its development. The one point in common in the two cases is disease of the mitral valve.

W. F. Hamilton and C. F. Martin ²⁸²_{Dec., '96} report a case of pyæmia with suggestions as to the possible cause of the presence of a presystolic murmur without stenosis of the mitral valve. In the case cited there had been present both adherent pericardium and aortic incompetence, and it would seem that still another suggestion might be admitted. The heart being enlarged to nearly twice its normal size and the chambers presenting extreme dilatation, the quantity of blood contained by them is correspondingly increased. Under such circumstances there would be a very much greater amount of blood endeavoring to force its way through the mitral orifice, especially with the great hypertrophy seen in the auricle. Hence with a normally-sized left auriculo-ventricular opening we have an excessive amount of blood seeking passage

through it; in other words, the proportion of blood to the size of the passage makes a relative stenosis of the orifice. It may be further mentioned that, in the majority of cases which present a similar set of conditions, very great dilatation has been present, and it would seem that according to the degree of dilatation—that is, the amount of blood within the chambers—so there would be a presystolic murmur or not, this sign presenting only when the amount of blood is extreme.

In the discussion of the paper Adami stated that the suggestions offered as to the cause of the presystolic murmur were very valuable. The older physicians regarded the presystolic murmur as an absolute diagnostic sign of stenosis of the mitral valve, but the work of the last few years has thrown doubt upon this view. There may be a presystolic murmur heard just before the ventricular systole in several conditions, such as adherent pericardium, aortic disease, and when there was actual enlargement of the mitral orifice.

In a critical study of the theory of hemisystole in mitral insufficiency, based on clinical and experimental observation, Ch. A. François-Franck⁴¹⁰_{July, '05} asserts that mitral hemisystole—that is, double right ventricular pulsation in opposition to single left ventricular pulsation—does not exist in mitral insufficiency, either in man or animals; the intermittent character of the pulse in these cases, as in analogous disturbances of rhythm without mitral lesion, are due to abortive contraction of the left ventricle. These abortive contractions are synchronous in both ventricles.

Phear⁶_{Sept. 21, '05} submits, as an explanation of presystolic murmur, that a thickening of the tendinous cords and dilatation of the ventricle may cause the two cusps of the mitral valve to be abnormally approximated and thus induce a functional stenosis, and adds a review of all previously recorded cases of presystolic apex-murmur without mitral stenosis,—i.e., 46. In 17 of these the aortic valves were incompetent, in 20 the pericardium adherent. In 12 cases there was present either a diastolic or a presystolic thrill; this cannot, therefore, be so certain a sign of mitral stenosis as has been heretofore supposed. The condition of the chordæ tendineæ is mentioned in 7 cases only: in 3 they are recorded as healthy; in 2 thickened, but not short; and in 2 they were found to be shortened. To these he adds 2 further cases, personal observations of his own. In both cases the aortic valves were competent; in 1 the pericardium was adherent and in the other this structure was healthy. In the opinion of Bernheim,⁸¹_{No. 89, '94} the so-called presystolic murmur is in reality systolic, sphygmographic tracings showing that a tenth of a second elapses between the

systole and the occurrence of the murmur. The murmur also follows the impulse of the heart.

In a clinical lecture on two cases in which a doubled second sound was audible only near the apex of the heart, A. Ernest Sansom, of London, Eng., ⁶May 11, '96 gives what he thinks sufficient reasons for the conclusion that the double sound simulating a repetition of the second sound in mitral stenosis is not due to non-synchronous closure of the valves of the pulmonary artery and the aorta, respectively. He believes that the second element of the double sound has its origin in the left ventricle, but does not pretend that the precise explanation of the phenomenon is placed beyond all doubt, and seeks for an explanation of the phenomenon as observed in cases of mitral stenosis. In these he says the doubling of the second sound is simulated, not real, and he does not go so far as to deny the possibility that, under conditions other than those of mitral stenosis, the second sound of the heart at the base may be heard as a double sound.

In an article on the sustained pulse-tension of mitral stenosis William Ewart ⁴⁵¹Feb., '96 expresses the opinion that the earliest mechanical result of a narrowing of the mitral valve is hypertrophy of the left auricle and of the right cavities of the heart. This is part of the compensation which is gradually established *pari passu* with the stenosis, and which lasts for varying, and often for long, periods. The signs and symptoms of the disease do not, however, assert themselves until a further stage is reached,—that of left auricular dilatation with secondary dilatation also of the right ventricle and auricle. These later changes he regards as the indirect cause of sustained pulse-tension; and among them none is probably so actively concerned in this causation as the dilatation of the left auricle.

In mitral stenosis the left ventricle is practically equal to its work; the venous obstruction is never such that it cannot be forced. This ventricular efficiency is probably retained almost to the last, for, after death, no evidence of its having been lost can be traced. That which fails is the material for work,—i.e., the blood. With increasing mitral stenosis the ventricular supply is gradually lessened, the ventricle contracts on less and less blood. This is due not only to the narrowing of the inlet, but also to the shortening of the diastolic time; this again is brought about by the dilatation and exhaustion of the right heart. The overloaded right ventricle falls into the hurry of weakness, and its systole loses power in proportion to its hurry.

The effect of this hurry on the left side of the heart is disastrous; the time of transit through the mitral constriction is dimin-

ished coincidently with a fall in the driving-pressure. Thus the left heart ceases not only to be properly filled, but also to be properly fed through the coronary arteries. It is at this stage—the stage of loss of compensation—that all resemblance ceases between the aortic and the mitral-stenosis pulses. The pulse in the latter disease is starved and quickened, whereas, with the former, aggravation of the stenosis slows the pulse without diminishing its volume to the extent that might have been expected until the final stages of left ventricular dilatation and exhaustion deprive it of its distinctive characters.

Picot, of Bordeaux, ³_{Aug. 17, '96} notes in hysterical subjects the existence of a temporary curable mitral stenosis. Post-mortem proofs of this fact have not been obtained, but two cases which came under his observation seem conclusive in this respect. The condition is, no doubt, due to a contraction of the tensor muscles of the mitral valve.

H. Huchard, ³_{Nov. 2, '94} in an article on mitral stenosis in arterio-sclerosis, states that, while the physical symptoms of this condition are very slight, the functional disturbances, on the other hand, are often extremely pronounced. The mechanical dyspnoea of mitral stenosis (by pulmonary stasis) is added to the toxic or ptomainic dyspnoea of renal sclerosis, placing the patients in a condition of extreme oppression. There are varieties of mitral stenosis characterized by intense arrhythmia, due to degeneration of the myocardium consecutive upon coronary sclerosis. The polyuria reported by Willis and Gendrin in certain cases of mitral stenosis, and which was attributed to a “congestive irritation of the kidneys,”—an incomprehensible condition in an affection in which the arterial tension is at its minimum,—is only met with in the mitral stenosis of arterio-sclerosis in which the renal sclerosis is the main factor in its production. Certain patients may die suddenly of angina pectoris when, in the mitral stenosis of arterio-sclerosis, the sclerosis has invaded the coronaries. These facts are of great practical importance, and the symptoms arising in this morbid complexus should be variously treated. Thus the dyspnoea, which may be either toxic or mechanical, should be first treated with milk and afterward with digitalis.

Aortic Insufficiency.—According to Bernheim, of Nancy, ¹⁴_{Mar. 10, '96} aortic insufficiency, with concomitant stenosis, may give rise to a systolic and diastolic murmur, beginning before the first and second heart-sounds in such a manner as to appear presystolic and prediastolic. The systolic bruit of aortic insufficiency is always located at the base of the heart and extends into the carotids. The diastolic bruit is most frequently present at the base, though ex-

ceptionally it is not heard at the base, but nearer the apex, toward the fourth intercostal space.

Herman F. Vickery, of Boston, ⁹⁹_{Dec. 5, '96} gives an account of an unusual case of aortic regurgitation. Over the aortic valve a loud diastolic murmur could be heard not only with the ear against the chest, but two inches from the man, without touching him at all, and over his entire body. While the murmur was audible over the humerus, it was not to be detected over the brachial artery. It seemed to be conducted by the bony skeleton and the muscles rather than by the blood-vessels.

In a case of aortic regurgitation seen by Graham Steell, of Manchester, ⁶_{Mar. 9, '96} the presystolic bruit was not low-pitched and rumbling, but of that loud, rolling character which reminded him of the sound produced by a flapping sail as it is filled by a puff of wind. Well marked though the murmur was, the mitral orifice proved to be of natural size. There was also a presystolic thrill at the apex. Another patient seen by him, ⁶⁷³_{Jan., '95} suffering from aortic incompetence, afforded an example of Traube's sign, —a double sound in the femoral artery. He pointed out that Traube's sign consisted of sounds resembling the normal heart-sounds, and not of murmurs like the sign of Duroziez, which, moreover, unlike Traube's sign, required pressure upon the artery with the stethoscope to bring it out. Traube regarded his rare sign as indicative not merely of aortic incompetence, but of very free regurgitation and much dilatation of the left ventricle. Steell's case bore out this belief.

Schlesinger ³_{Dec. 18, '95} presented at the Medical Club of Vienna a patient in whom could be heard a musical diastolic bruit, perceptible with the same intensity in the subclavicular, carotid, and vertebral arteries. The patient likewise showed symptoms of aortic incompetency. The sudden appearance of these sounds in a cardiac subject is indicative of a valvular perforation.

In an article on relative aortic insufficiency caused by chronic fibrous myocarditis, Arthur R. Edwards, of Chicago, ⁵_{Oct., '95} states that aortic is the rarest of all relative insufficiencies. In pulmonary embolism a relative pulmonary lesion occurs. Relative mitral inadequacy results from any cause operating through ventricular hypertrophy and dilatation. Atrophy of the papillary muscles, caused by pressure of a retrograde blood-column in aortic regurgitation, induces mitral incompetence. Bamberger described relative mitral lesions whose antecedent was fatty degeneration in the papillary muscles. Perverted innervation and inflammation of the muscular papillaries are additional causes. The combined literature of England, France, and Germany does not record more than

about twenty-five cases of relative aortic insufficiency, and some of these are reported twice, though dearth of details precludes their detection.

Tricuspid Stenosis.—A case of tricuspid stenosis associated with mitral and aortic stenosis is reported by Thomas G. Ashton and Alonzo H. Stewart.⁵ These authors stated that the diagnosis of tricuspid stenosis during life is rarely made, and, in this connection, the statement is made by Shattuck that, in the eighty-nine cases upon which he bases his article, and which include the seventy cases brought forward by Fenwick, a diagnosis was made during life in less than half a dozen instances.

At a meeting of the Société Anatomique, Macaigne and Schmidt¹⁴ presented a heart showing stenosis of the tricuspid orifice. It was that of a young woman who, after a miscarriage of four months, had suffered from slow puerperal infection. About a month after the appearance of the infectious symptoms the existence of a cardiac lesion was discovered, which made itself known by a diastolic rumbling and a presystolic murmur without a repetition of the second sound. Although the bruits had their maximum a little inside and slightly below the nipple, owing to their rhythm a diagnosis of mitral stenosis was made. The autopsy showed that the lesions, which were those of infectious endocarditis, were exclusively localized at the tricuspid orifice, and that the mitral orifice was normal.

Miscellaneous Murmurs.

Cardiac and Vascular Murmurs.—It is well known that current explanations of the cause of cardiac and vascular murmurs in works on physical diagnosis ascribe these to eddies in the blood-current, although Kiwisch and T. Weber showed long ago that they must be due to vibrations in the walls of the vessels (or in the valves). This explanation is also given by Fick,²¹⁵¹ and there have always been a few clinicians who have held to this theory, though perhaps unable to give any reason for it. Recently Geigel²⁰ has investigated the matter according to well-known facts in physics. Assuming with Funke that the first sound of the heart corresponds to sound-vibrations at the rate of 200 per second, a murmur of the same pitch would require for its production, if due to eddies, a tube (the heart) one metre and fifty centimetres long. This shows the fallacy of the eddy theory and leaves the theory of lateral vibrations in the walls or valves, due to the friction of the blood, the only rational one.

Accidental Murmurs.—Sahli, of Berne,²¹⁴ speaking of purely accidental murmurs, thinks that there is reason to believe

that they occur wherever the conditions are favorable to an abnormally rapid blood-flow. He is also of the opinion that the physical nature of the blood in anæmia plays a certain part in causing these murmurs, since, having less corpuscles, the whirling motion, which causes abnormal sounds, is favored. The author cites two cases of pernicious anæmia in which autopsy justified his belief in the existence of diastolic accidental murmurs.

Angina Pectoris.

Sir Benjamin Ward Richardson ³⁸_{4th Q., '94-'95} suggests that angina pectoris is, in itself, an actual disease, a disease of a paroxysmal nature and quite as distinct as epilepsy, partaking in many ways of its features and being of a similar and of as universal a character. Angina pectoris, instead of being dependent on a disturbance in the cerebro-spinal system, affecting all parts under it, is due to a disturbance in the sympathetic nervous system, and affects all parts under that system. In angina it is a violent sympathetic discharge with an unconscious spasm,—a primary spasm of the unconscious, or involuntary, muscles.

In relating two cases in which angina pectoris, gouty arthritis, and diabetes were associated, Ebstein ⁴_{June 24, '95} considered probable that the angina depended on disease in the circulatory apparatus, as changes in the heart were noted in both. He thinks that a sharp distinction cannot be drawn between angina caused by anatomical changes and that due to functional causes. He has observed cases in which such anginal attacks have existed during many years. The prognosis is, however, serious, even if no change can be made out in the circulatory organs.

Cazenave de la Roche ¹⁶⁴_{Oct. 16, '95} publishes three fatal cases of angina pectoris and a case of arterio-sclerosis, probably of bacteriological origin, all observed in the same family. The theory most in vogue is, perhaps, that which ascribes the heart-pang to obliteration of the coronary arteries. Huchard ¹⁴_{Nov. 25, '94} ⁶_{Dec. 1, '95} exhibited a specimen to the Société Médicale des Hôpitaux in which this condition fully explained an attack, lasting half an hour, which determined the death from asphyxia of a man aged 33 years. The necropsy brought to light recent subacute aortitis, with almost obliteration of the opening of the two coronaries. The orifices allowed the penetration of only a boar's bristle. The coronary arteries had otherwise lost none of their suppleness and normal calibre. The pain complained of by the deceased was of the nature of that accompanying intense gastralgia (pseudogastralgic form of angina pectoris).

Koudriarzev ¹⁸⁸_{Oct. 6, '95} relates a case in which periodicity was a

marked feature of the accesses. Suspecting that malaria might have had some influence in the etiology of the trouble, quinia sulphate, $7\frac{1}{2}$ grains (0.5 gramme) daily, was administered. The angina pectoris disappeared permanently.

Grusdew⁵⁸⁶_{Dec.15,'94} considers gastric disorder as the most frequent cause of angina, after sclerosis of the coronary arteries, and describes eight cases in which serious attention to the stomach and intestines led to prompt recovery. Tenderness and swelling in the epigastric region are marked diagnostic signs in these cases.

Debove,³¹_{Dec.14,'95} in referring to tabetic angina pectoris, says that no organic lesion of the heart or of the large vessels exists to explain the phenomenon of angina. He considers that these painful attacks must be regarded as visceral crises analogous to those of other internal organs in tabetic subjects. The characteristic point of the angina pectoris affecting a patient seen by him was that the attacks are always preceded by a sensation of thoracic constriction,—a common symptom in ataxic patients.

Diagnosis.—Potain, of Paris,²⁴_{Oct.6,'95} states that in angina pectoris caused by a coronary lesion the attack is due to a sudden increase of cardiac labor. The pain is of a tearing, burning character, and is substernal, whereas in tobacco-angina the attack is spontaneous, without any effort on the part of the heart, and lasts several hours. The pain is often substernal, but also frequently præcordial; it is as intense as in true angina pectoris, but there is a feeling of dilatation. This rule, although not absolute, will be found to apply in the majority of cases, and it will also be observed that, whereas in true angina pectoris the least movement will increase the attack, that due to tobacco is in nowise influenced by movement.

Treatment.—Methylene-blue is recommended by G. Lemoine,¹¹⁸⁹_{No.15,p.185,'95} who states that after the administration of this agent the painful crises diminish in frequency and intensity and finally cease altogether. In a case described by the author there was true angina in a man, 50 years old, who had very pronounced arterial atheroma and in the heart a murmur with the second beat at the aortic orifice. Methylene-blue was given without interruption from the 12th of May until the end of June, and then daily for a week every other week until the 15th of August. From the beginning of the treatment the patient has not had a single attack of angina; it would be impossible to affirm that he has been cured, but three months' treatment by iodide of potassium and trinitrin did not give the slightest relief.

Huchard,¹⁰⁸_{July 1,'95} alluding to angina pectoris in diabetic and

gouty subjects and the treatment of the same, states that (1) diabetic and gouty varieties of angina pectoris do not exist, and (2) that there are no specific remedies for such anginas. In his opinion, the attacks of angina observed during these diseases are not directly caused by gout or diabetes, but by a concomitant aortic lesion. Gout is to the stomach what rheumatism is to the heart,—that is to say, it nearly always induces arterio-sclerosis. However, angina pectoris in gout is not always of coronary origin: gouty patients, who are frequently dyspeptic, may have symptoms of pseudo-angina, of gastric origin; gouty subjects also frequently have nervous disturbances, and in them the pseudo-angina may be of neuralgic origin, and not coronary.

Nitrite of amyl was first introduced by Sir Benjamin Ward Richardson³⁸ as a liquid to be inhaled in doses of 2 to 5 minims (0.13 to 0.32 gramme), and he believes that Lauder Brunton, who prescribed it specially for angina pectoris about 1867, administered it by inhalation. Later on it was made into a mixture, so that it could be taken by the stomach slowly and, the author thinks now, with better effect than when it was inhaled, because it seems, when swallowed, to act favorably on the whole course of the sympathetic nervous system. As a mixture, he has usually combined it with glycerin, putting 3 minims (0.20 gramme) to 1 drachm (4 grammes) of glycerin, adding 3 drachms (12 grammes) of water, and ordering that quantity to be taken at intervals in the course of an hour, diluted further with an agreeable quantity of water.

Perforation and Rupture of the Heart.

After having succinctly reviewed the statistics of spontaneous rupture of the heart Nebolionboff³¹ observes that, among ten hundred medico-legal autopsies made at the faculty of Kasan, there was only one case of spontaneous heart-rupture,—that reported by Leontieff. The author cites a personal case, in a workman, 55 years old, who had fallen from the fourth floor while intoxicated. No traces of blood or of appreciable traumatism were visible, but the autopsy showed that death was due to internal hæmorrhage caused by rupture of the heart.

J. A. Tanner, of Dorchester,⁹⁹ gives an account of a case of spontaneous perforation of the heart presenting obscure symptoms. The patient—a well-built, well-preserved, strong and active man for his age of 84 years—was found suffering from a severe pain in the epigastric region, the pain extending to the right hypochondriac region. Accompanying the pain were nausea and straining efforts to vomit, with eructations of gas. The pain

came on suddenly, and no cause could be traced of overeating or error of diet. There was no rise of temperature; the pulse was full and strong and beating about 80 per minute; the respiration was regular. At the autopsy, eighteen hours after death, rigor mortis was well marked, and moderate lividity of dependent parts of the body found. Pericardium was adherent over the greater part of the left ventricle by soft, fibrinous adhesions readily torn away. When this was done a hole the size of a knitting-needle was found in the wall of the left ventricle, from which dark fluid blood oozed. This hole was situated about one and one-half inches from the apex and about the same distance from the septum. A little reddish, serous fluid was found in the pericardial sac, but no free blood.

In a case recorded by Szegeté⁵⁷_{May 5, '95} there was found, on the posterior wall of the left side of the heart, a thinned area with a fissure eight millimetres long, through which about 300 grammes ($9\frac{1}{2}$ ounces) of blood had poured into the pericardium. The immediate cause of death was this rupture. The heart-muscle was fatty degenerated, and an endarteritis deformans was present, while both kidneys were shrunken.

In a case reported by Dudley W. Collins, of London,⁶_{Apr. 20; June, '95} the heart-sounds were faint, but there were no added sounds. The attack began with severe pain in the præcordium, followed by the hemiplegia. The history of the case was negative. On the day after admission, as the patient was being lifted on to the bed-pan, he died almost instantly. At the autopsy the pericardium was found filled with blood-clot, and a laceration about one and one-half inches in length was seen in the lateral wall of the left ventricle. The heart-muscle was in an advanced stage of fatty degeneration; there was no valvular lesion. F. W. Edridge-Green²_{June 1, '95} reports a case of thrombosis and rupture of the heart in a boy, $9\frac{1}{2}$ months old, who had died without apparent cause. On making a post-mortem examination he found the pericardium distended with fluid blood and a rupture one-third inch in length in the right ventricle. It was gaping and started about the middle of the ventricle, at its junction with the septum ventriculorum. On opening the right ventricle he found a white thrombus loose in the cavity.

A. E. Patterson²_{Mar. 16, '95} reports a case of rupture of the heart in a woman, 72 years old, suffering from chronic mania, and H. U. Williams, of Buffalo,⁵⁹_{May 18, '95} another, due to atrophy of the left ventricular wall through atheromatous degeneration.

Vincent Griffon⁷_{Nov. 23, '94} observed a case of spontaneous rupture of a macroscopically healthy heart, following immediately upon

the announcement of some bad news. The seat of the rupture was the posterior surface of the left ventricle, at the union of the lower third with the middle third, not far from the left edge. The rupture was complete; there was an internal and an external orifice. The length of the exterior tear was three centimetres.

The important part played by infectious diseases in the production of cardiac and vascular changes is fully recognized, and these maladies may therefore also be considered as having an important influence in the pathogenesis of rupture of the heart. The four cases reported by Chiperovitch, of St. Petersburg, ¹⁴ Sept. 4, '96 would go to prove this. Three of the patients were already well on in years, attacked by influenza, coryza, cough, myalgia, fever, etc.; after some sudden movement or other equally slight cause they suddenly died. At the autopsy the usual bronchial changes found in the pulmonary varieties of influenza were observed in all three, as well as a rupture of the left ventricle varying in length from one-fourth to one centimetre, the heart being attacked by myocarditis. The last case, that of a young man 36 years old, is particularly interesting because it shows that rupture of the heart may require several days to intervene before the fatal issue; so that, once the diagnosis is established, surgical intervention would, in the opinion of the author, be possible.

Syphilis of the Heart.

H. P. Loomis ⁵ Oct., '96 describes the pathological changes in the heart, which were undoubtedly of syphilitic origin, in cases which he has collected from a large series of autopsies that have come under his personal observation.

The most easily recognized and characteristic action of syphilis upon the heart is the development of gummatous tumor in the cardiac muscle, almost invariably in the wall of the left ventricle. In some cases there is difficulty in diagnosing cardiac gummata from sarcomata, solitary tubercles, or early abscesses. Microscopical examination must be made in such cases, and sections stained for tubercle bacilli. The 4 cases of syphilitic gumma which have come under the author's observation were not diagnosed during life; 3 died directly or indirectly from the lesion, and 2 of them suddenly. Notes of 3 cases are given. Besides gummata, syphilis gives rise to an indurated myocarditis, which in its later stages is hardly distinguishable from fibroid disease due to other causes. It is only possible to infer the origin of these new growths by the antecedent history of the individual, by the presence of constitutional syphilis, and especially gummata in other situations.

The author believes that, as our knowledge of syphilitic diseases of the heart becomes more perfect, syphilis will be recognized as an important etiological factor in the production of chronic cardiac disease, and that many patients will recover under antisyphilitic treatment. Fifteen cases of fibroid myocarditis have come under the author's observation, and of these three were undoubtedly of syphilitic origin. The history of one case is given. Gummata, fibroid induration, and amyloid infiltration are the only syphilitic changes observed by the author in a large series of autopsies. Endarteritis of the vessels of the myocardium, often inducing infarcts, has been noted by some observers. The following table illustrates the different forms of syphilitic disease of the heart:—

SYPHILITIC LESIONS OF THE HEART.

- | | |
|--|---|
| I. Gummata. | 1. Recent: Soft, reddish or gray masses. |
| | 2. Old: Dry, yellow, cheesy nodules. |
| II. Fibroid induration. | 1. Localized: Well-defined masses, large size. |
| | 2. Diffused: Accompanied by inflammation of arteries. |
| | 3. Intermediate form: Outer zone of gumma develops into fibrous tissue, cheesy centre, remains as fibroid mass. |
| III. Amyloid degeneration. | |
| IV. Endarteritis obliterans, often inducing infarctions. | |

From an analysis of the cases personally observed, and from a study of cases reported by other observers, the author comes to the following conclusions with regard to the symptomatology: When symptoms of cardiac failure occur during the prime of life, for which no cause can be ascertained,—such as rheumatism, valvular disease, arterial changes, or kidney disease,—especially in a patient having a syphilitic history, these symptoms should always suggest syphilis as the cause of the condition.

Cases of sudden death from cardiac syphilis were reported at the London Clinical Society by Sir Dyce Duckworth⁶⁷³ and Sidney Phillips, who had collected a large number of recorded cases. In one case, a man, aged 55, died suddenly, the only previous history being occasional pain in the chest, to which no great attention had been paid. Hale White observed that the experience of nine cases known to himself showed that six died suddenly,—bearing out a statement made by Phillips that if symptoms were looked for they could generally be discovered. Two of these had been attending hospital for some trivial ailment,—pain, shortness of breath, etc. The remaining four were picked up dead in the street, and the others were sufficiently ill to be in the hospital. Of these nine cases four were absolutely certain and the other five were ailing more or less. Consequently, if a sub-

ject who was known to have had syphilis presented cardiac symptoms which could not be ascribed to any ordinary lesion, it was a fair inference that the syphilis was producing cardiac gumma or fibrosis. Nearly twenty years ago Fagge had collected a series of such cases, and his results were practically the same.

Diagnosis.—Rendu¹⁴_{May 5, '96} presented a specimen taken from a patient who had suffered from cardiac syphilis and who had had a permanent slow pulse (30 to 35 beats),—a feature of interest, since the author states that in all the cases of cardiac syphilis so far observed by him the pulse was weak, rapid, and irregular, but not permanently slow.

Semmola³⁴¹_{June 21, '96} holds as pathognomonic a persistent arrhythmia, either existing alone or accompanied by tachycardia, respiratory troubles coming and going, resistance to all ordinary methods of treatment, and a history of syphilis. Through syphilitic stenosis of the coronary artery the symptoms of angina pectoris may be caused. Exceptionally murmurs are developed.

Prognosis.—Mracek, of Vienna,³⁴¹_{June 21, '95} states that the course of syphilis of the heart is extremely slow and insidious. There is rarely any acute process, such as softening of a gumma, but rather a slow transformation into fibrous tissue. Judging from reported cases, the prognosis is extremely bad, death coming suddenly and often in the midst of apparent perfect health. In sixty-three cases collected by the author sudden death occurred in one-third of the number. He quotes Jullien and Mauriac, who stated that this end is observed in 50 per cent. of cases. Death comes after a heavy meal or from drinking or straining. Often the patients are found dead in bed. Many cases perish in coma from heart-failure. Some die of embolism.

Treatment.—When the disease is recognized early and properly treated, Mracek³⁴¹_{June 21, '95}; ⁸⁰_{Oct. 15, '95} states that the prognosis is fairly good. According to Rosenfeld, respiratory disturbances, if of long standing, are always of serious import, as is albumin in the urine. Buchwald and Semmola hold that, if the symptoms are simple arrhythmia without further objective appearances, the specific treatment promises well. Frequently, however, the patients do not observe this symptom, and come for treatment only when the disease is well advanced and such changes are produced that specific treatment promises little or nothing, degenerative processes having extended so far that restitution of tissues to normal is impossible. Even in the most severe forms a relative improvement under treatment is nearly always noted.

Treatment must be thorough and long continued; immediate effects cannot be looked for, since this is a late manifestation of

the disease. Every advantage must be taken of air, surroundings, food, and general hygienic regulations. The mixed treatment serves the best purpose. Iodide of potassium should be given in large doses of 90 to 120 grains (6 to 8 grammes) a day, and mercury should be administered in the form of inunctions. This treatment should have frequent intermissions.

Tumors of the Heart.

Polypoid Growths.—In a case seen by Pawlowski¹¹⁴_{B.20,H.5,6} obstruction to the circulation was caused by a pedunculated myxoma in the auricle, which hindered the closure of the mitral valve. If the heart were placed in a vertical position, the tumor pressed against the venous openings and embarrassed the circulation in a more marked degree.

An interesting case of pedunculated polypus of the heart is reported by Krumm³²⁶_{B.54,p.189,'95} in a woman, 44 years old, who had been affected with gangrene first of one then of the other leg, and in whom no abnormal cardiac symptom was observed during life. At the autopsy the author found, at the apex of the left ventricle, a thrombus four centimetres in height, solidly attached to the wall of the heart by a pedicle.

Malignant Growths.—Post-mortem examination revealed sarcomata of the heart in a man, 59 years of age, under the observation of J. S. Thacher, of New York.⁵⁹_{Mar.2,'95} Eleven months before, after exposure, he had begun to suffer from dyspnoea, palpitations of the heart, and vertigo. Six months later œdema of the feet supervened, lasted for about one month, and afterward occasionally recurred. The patient was emaciated, but not anæmic. An examination of the heart revealed only a moderate roughening of the sounds at the apex. There was some pain in the abdomen, chest, and left shoulder, and later there was severe pain in the epigastrium. Later on grating friction-sounds were heard over the apex of the heart, and there were signs of fluid over the left chest. A needle was introduced and clear serum withdrawn, which gave no cultures. The urine showed traces of albumin and some granular and hyaline casts. The temperature was elevated most of the time, ranging between 100° and 103° F. (37.8° and 39.5° C.). At the autopsy an abundant fibrinous pericarditis was found, and in the wall of the left auricle a firm mass measuring 3 x 2 x 1½ inches. On section it was cheesy in appearance and was broken down at the centre, and there was a communication with the stomach by an aperture one inch in diameter. Microscopical examination of these growths showed them to be small, round-cell sarcomata with considerable hæmorrhage and necrosis.

At a meeting of the Pathological Society of Manchester Wild²_{Dec. 28, '95} reported a case of secondary cancer of the heart. Microscopical preparations showed that the nodules had the structure of a squamous epithelioma; typical cell-nests were numerous and the new growth infiltrated the cardiac muscle. There were no cardiac symptoms during life.

Cysts.—Firket, of Brussels,⁶⁷³_{Sept., '95} cites a case in which he found, at the autopsy, a *Cysticercus racemosus* in the cardiac muscle. Nothing in the clinical examination of the patient would have enabled a diagnosis to be made. Microscopical examination showed that this cysticercus was related to the *Tænia solium*, its irregular form being due, in the author's opinion, to unequal pressure upon the vesicle, and also to a diminution in its vitality. The case is regarded as an extremely rare one.

[That special form of the *Cysticercus cellulosæ* called *C. racemosus* has seldom, if ever before, been found outside of the great nervous centres; but the ordinary cysticercus occurs, of course, in the skin, the brain, the eyes, and the muscles. Echinococcic cysts have been found in the heart and blood-vessels in 61 cases out of a total of 1862.—E. N. W. and H. F. V.]

Cyanosis.

Pathology.—The condition of the blood in congenital cyanosis has received considerable attention during the year. In a case reported by Marie¹⁴_{Jan. 18, '95} there were from 7,500,000 to 8,000,000 corpuscles per cubic millimetre instead of 5,250,000, the normal number, and 0.60 per cent. of iron instead of 0.44 per cent. This increase the author attributes to difficult hæmatosis, through the mingling of arterial and venous blood, and especially through stricture of the pulmonary artery, so frequent in these cases. Hayem³¹_{June 22, '95} expresses the same opinion, apropos of a patient seen by him, suffering from congenital cyanosis with transposition of the viscera.

The latter author opposes the view of Vaquez,¹⁴_{Jan. 20, Mar. 8, '95} that the increase of blood-cells is due to increased activity of the hæmatopoietic system, and that the color of the skin depends upon the excessive number of globules. Variot, however, is a partisan of this view, the skin owing its blue color to the lack of oxygen in the blood.

G. A. Gibson, of Edinburgh,⁶_{Jan. 5, '95} examined the blood in a case under his care, a boy 8 years old, and found that the amount of hæmoglobin was 110 per cent., and the number of the red corpuscles and leucocytes, respectively, 8,470,000 and 12,000 per cubic millimetre. In another patient, a boy aged 2 years and

4 months, suffering from congenital heart disease, the hæmoglobin was 92 per cent., the red corpuscles numbered 6,700,000 and the white corpuscles 12,000 per cubic millimetre. Carmichael²⁰⁹⁸_{V.2,'94} had a patient with 8,100,000 red corpuscles and 16,000 white corpuscles per cubic millimetre. The theory favored by Gibson as accounting for the presence of so great an increase is that, the functions of the corpuscles being lessened, their wear and tear is not so great and their individual duration is increased. The number of the corpuscles must in this way be proportionately augmented, and this must lead to the numerical increase, as well as to the high percentage of hæmoglobin, until a balance is struck between the production and destruction of the blood-corpuscles.

Eichhorst, of Zurich,³¹_{Apr.27,'95} cites two cases presenting several interesting points. The patients were brother and sister; the latter had died at the age of 5 years; the boy, still living and aged 12 years, was deaf and dumb and suffering from otorrhœa and dynamic nystagmus. The red corpuscles showed 9,000,000 to the cubic millimetre and the hæmoglobin 170 in the Gowers-Sahli hæmoglobinimeter.

Cases of congenital cyanosis sustaining the views of Gibson, Marie, and Pengoldt as regards the existence of hyperglobulia as a marked feature of the disease are published by Alberico Testi.⁵⁰⁵_{Nov.12,'95} Cases are also described by David Bovaird, of New York,⁵¹_{May,'95} and H. W. McLauthlin.²⁰²_{Aug.26,'95}

Diagnosis.—According to H. Richardière,¹⁷_{July 20,'95} cyanosis, even in typical cases, is subject to considerable variation, the violet color of the skin and mucous membranes, more or less pronounced in the ordinary condition of the patient, becoming temporarily exaggerated during effort or emotion or during intercurrent diseases of the respiratory passages. In certain instances veritable crises seem to supervene without appreciable cause, lasting from several hours to several days, the skin becoming livid. Dyspnœa, always present in such cases, follows the variations of the cyanosis. In a patient observed by him at the Hospital Hérold, Paris, and previously described by Variot and Chabry,¹¹³⁹_{p.1056,'94} this variability exists in a marked degree. The mere addressing of the boy causes the cyanotic color of the face to increase, and he becomes blue at the slightest emotion.

This variability of symptoms, especially in cases of cyanosis with non-occlusion of the foramen ovale, seems, *a priori*, paradoxical; a congenital and definite lesion should apparently cause definite and fixed clinical symptoms. Observation shows that this is, however, far from being the case. In congenital affections of the heart cyanosis frequently does not appear until some time after

birth. In some cases it develops suddenly after a violent effort or a disease of the respiratory tract. Chatin and Bret ³⁰⁴_{May, '96} confirm the existence of this late form. In the case described by Marie the disease ¹⁴_{Jan. 13, '95} declared itself at the age of about 30 years. The patient had suffered from dyspnœa from infancy. A similar case is described by Richardière, in which the cyanosis followed severe bronchitis at the age of 30. At the autopsy the foramen ovale was found to be permeable.

Treatment.—As regards the prognosis in these cases, Jules Simon ¹¹⁵³_{Mar. 30, '95} states that, when due care is exercised, patients with congenital cyanosis may live to the age of from 13 to 22 years, while some have been known to reach the age of 50 to 60 years. Exertion must be avoided, and arsenic and phosphate of lime used as tonics, with digitalis, for ten days every month.

Gastric Cardiopathies.

Hayem, ³¹_{No. 59, '95} in discussing a case of acute asystole, alludes to the connection between a gastric affection and the heart-functions. Chomel had noticed in dyspeptics palpitations, intermittent pulse, attacks of pseudo-angina pectoris (pain in the præcordial region, with irradiation into the left arm). The symptoms which attracted the attention of Potain were temporary or persistent pulmonary or cardiac affections. The pulmonary phenomena varied from slight dyspnœa to orthopnœa. The cardiac disturbances may be due to simple dilatation of the right heart, causing incompetence of the tricuspid; when the pulmonary and cardiac troubles are developed to their maximum degree, the patient has a true attack of acute asystole. Following these attacks chronic cardiopathy has never been noticed.

Potain considers these disturbances to be reflex, originating in the stomach from non-digestion of food. The pneumogastric nerve is excited and acts upon the heart alone, or upon the heart and lung, through the vaso-constrictor nervous net-work originating in the great sympathetic nerve. Spasm of the pulmonary capillaries causes exaggerated tension of the pulmonary artery, and this, in turn, dilatation and hypertrophy of the right ventricle. Another theory is that of mechanical distension of the stomach. This distension may, according to Hayem, explain the two classes of phenomena observed,—the extra-cardiac bruits and the symptoms of asystole. In a case described by the author the distension was such that the diaphragm was immobilized and the heart and liver were pushed back, probably causing the bruit at the base. As for the apex-bruit, it was probably the consequence of the shock communicated by the heart to the large *cul-de-sac* of the

stomach, filled with gas and liquid. The patient was, therefore, a gastropathic, and not a cardiopathic subject. There was an incomplete stenosis of the pylorus, probably due to a chronic ulcer in the neighborhood of the sphincter. The compression exercised by the accumulation of gas and liquid in the stomach upon the thoracic organs gave rise to attacks of acute asystole twice in eighteen months. Treatment of the gastric affections speedily caused the cardio-pulmonary symptoms to disappear.

Senile Heart.

Pathology.—Robert H. Babcock, of Chicago, ⁵⁹_{Nov. 9, '95} contends that the term "senile heart" is unfortunate, because the degenerative changes underlying the disease are not limited to the aged. The changes in the heart-muscle are generally those of chronic myocarditis, and their real extent and location often escape recognition. He quotes Radazewsky's investigations indicating that the connective-tissue changes affect the auricles more often than is generally supposed, and often exceed degeneration of the ventricles.

In commenting on arterio-xerosis, or normal senile arteries, Boy-Teissier ³_{Aug. 10, '95} thus briefly summarizes the modifications which take place in the arterial tissue: (1) connective-tissue hypergenesis wherever this tissue exists normally; (2) preservation of the relation of the various constituent elements of the artery; (3) absence of all traces of inflammation capable of accounting for this hypergenesis.

Treatment.—Asa F. Pattee, of Boston, ⁶¹_{June 8, '95} states that, in attacks of angina due to senile heart, nitroglycerin is of great benefit— $\frac{1}{100}$ -grain (0.00065 gramme) tablet, three or four times a day—and that it will quickly relieve the pain. In some cases the patient requires an active cholagogue purge. If at any time the patient should have severe dyspnœa, fluid extract of quebracho, in doses of 15 to 30 drops every three or four hours, in water, should be given.

R. H. Babcock ⁵⁹_{Nov. 9, '95} contends that the paroxysmal exacerbation of dyspnœa, called "cardiac asthma," is due to disproportionate weakness of the left ventricle, and is most promptly and efficiently relieved by the hypodermatic injection of $\frac{1}{8}$ grain (0.0075 gramme) of morphine and $\frac{1}{200}$ grain (0.00032 gramme) of atropine. Stadelmann's experiments appear to confirm Unverricht's assertion, that morphine and atropine exert no antagonistic influence over attacks of Cheyne-Stokes respiration. Nevertheless, since morphine hypodermatically was shown sometimes to modify in a favorable manner the severity of the attacks, and since it blunts the patient's sense

of dyspnœa and induces sleep, its employment hypodermatically is justified in these cases. It should be administered in cardiac cases hypodermatically, and in as small a dose as will accomplish the result desired; given in this manner it acts as a powerful cardiac stimulant.

General Diagnosis of Cardiac Diseases.

Percussion-Area.—The frequency of endocarditis and pericarditis in children, and the fact that an accurate diagnosis depends largely upon the percussion-signs, merit, according to H. B. Whitney, of Denver, ⁵¹_{Nov., '94} a more careful study of the normal præcordia in childhood than has hitherto been made. In a careful search through the literature on this subject he finds nothing which at all approximates a full and accurate statement of the facts. Observations made by the writer upon a comparatively large number of children have led to the following conclusions: 1. In children, until the beginning of the sixth year, the relative dullness of the normal heart has practically the same limits as in the adult. 2. From the fifth to the ninth year the præcordial dullness varies in different cases. At the age of 9 the infantile præcordia had entirely disappeared. During the period, therefore, from the fifth to the ninth year the diagnostic value of præcordial dullness *per se* must prove equivocal. 3. In children over 8 years and up to the age of puberty the limits of the normal præcordia are invariably found to differ widely from those of the first half of childhood and of adult life. The upper border is generally higher. It is often as high as the second interspace and occasionally as high as the second rib. The apex is usually a quarter- to a half-inch outside the mammary line. The right border, instead of being perpendicular along the left edge of the sternum, is a curved line which meets the line of liver-dullness at a point outside of the right sternal edge one and a quarter to one and a half inches to the right of the median line. The outline is somewhat similar to that of a pericardial effusion.

R. Hingston Fox, of London, ⁶_{Apr. 13, '95} states that Whitney's conclusions are altogether at variance with the observations of Stârck, who found that the area diminished with the child's age, falling between the sixth and twelfth year by the width of a rib, and that the apex-beat, which was at first outside the nipple-line, became internal to it after the age of 6 years. He quotes Garrod as supporting Stârck's views, and suggests that the area of cardiac dullness may greatly vary in healthy children.

[See the ANNUAL for 1895, vol. i, B-13.—E. N. W. and H. F. V.]

Rhythm.—Cardiac arrhythmia in children, according to Heubner,¹¹⁴_{Dec., '94} may occur as one of the symptoms of either of the following conditions besides the idiopathic form: 1. Poisoning, as by digitalis, stramonium, and opium. 2. Digestive disturbances due to auto-intoxication. 3. Diseases of the abdominal organs with vomiting, but without other evidences of auto-intoxication. 4. Infectious diseases during the onset, the crisis, or in convalescence. 5. Anæmia and nervousness. 6. Irritation by intestinal parasites. 7. Excitement and bathing.

Kisch, of Marienbad,⁴_{Mar. 18, '95} studied the cardiac arrhythmia so frequently observed in the obese, and concludes that the apprehension of grave disease of the circulatory and respiratory apparatus usually entertained is not warranted. Slight intermittence after a series of regular beats, followed by a pause, is observed in youthful patients with slight heart trouble, especially in young girls who exhibit the anæmic form of lipomatosis. Actual irregularity, in which regular beats and pulse-pauses alternate, is seen chiefly in fat people who have already passed their fiftieth year, and in whom other symptoms of heart trouble are present. Complete irregularity, in which pulse-waves alternating in tension and size regularly follow one another, is seen in cases of obesity with marked heart-weakness, in which there is dyspnoea, angina pectoris, œdema, and dropsy. Kisch holds, in contradistinction to French authors, that simple cardiac intermittency and slight irregularity are not unfavorable as regards prognosis, and these cases may be seen, after a course of treatment directed to adiposity, to recover their pulse-regularity. On the other hand, he regards the occurrence of complete irregularity, *delirium cordis*, as a sign of grave disturbance of the heart-mechanism which can never be completely removed, and sometimes also premonitory of sudden death.

Sensory Phenomena.—James Mackenzie, of Burnley,⁶_{Jan., '95} lays stress upon the importance, as diagnostic signs, of the sensory phenomena exhibited in heart-failure. The symptoms so produced may be exhibited with affections of other organs, and the dependence of the disease of these organs on the heart-failure may be obscured or lost sight of. Thus many cases of chronic bronchitis are undoubtedly due to heart-failure; but, unless a valvular murmur or some irregularity is present, little regard is paid to it. If the sensory symptoms be studied, very frequently they will be so striking as to leave little doubt as to the primary source of the mischief. As to other diseases giving rise to sensory phenomena that are supposed to be characteristic of heart-failure, he has made careful examination of typical cases of asthma, bronchitis from

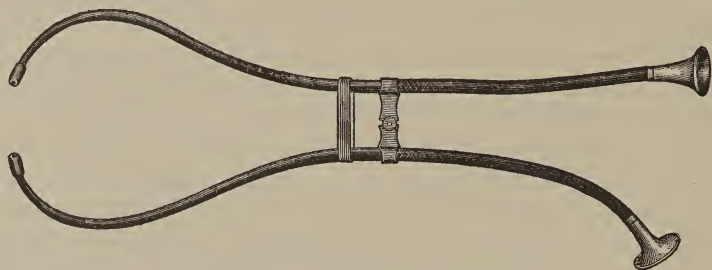
tuberculous causes, phthisis, pleurisy, etc., but has not found any difficulty in differentiating them. In phthisis, for instance, the whole chest may become hyperæsthetic, but he has never found it pick out the areas peculiar to the heart. Rarely at menstrual periods the breasts become tender, but then both breasts are affected. On the other hand, respiratory affections induced by heart-failure, where the heart ailment was demonstrable by murmur, increased size, and irregularity, presented sensory phenomena identical with those cases in which the respiratory affections have been induced by heart-failure, but where the sensory phenomena were the only reliable guides to the heart affection. Among several cases cited, in which verification became possible after the death of the patients, the following may be quoted:—

Case 1. A man, aged 58 years, of gouty diathesis, complained of pain, induced often by the slightest exertion, which arose in the left breast, passed up to the armpit, and extended down the inner surface of the left arm to the little finger. During an attack an abundant flow of saliva took place into the left side of the mouth. Careful and repeated physical examination revealed no cardiac abnormality. The left chest in front (skin and subcutaneous tissue), from the middle line to the nipple-line, was at times very tender to the slightest pressure. There was excessive tenderness on pressure over the second left rib in the nipple-line and over the second dorsal vertebra. The patient died suddenly, and, on post-mortem examination, the heart was found to have ruptured, the pericardial sac being full of blood. There was a small aneurism the size of a marble in the wall of the left ventricle, where the ventricular cavity was separated from the pericardial sac by a thin wall consisting only of pericardium and endocardium. In this thin wall there was a narrow slit. The coronary artery was very atheromatous. The external anterior thoracic nerve was found to be lying under the place, over the second rib, that had been so tender to pressure during life.

Case 2. A man, aged 59 years, complained of pain and shortness of breath on walking a short distance. The pain arose in the centre of the chest and extended out to the left and down the inner surface of the left arm. There was tenderness to pressure from the second to the fourth ribs on the left side in the nipple-line. There was a slight increase in the area of heart-dullness; otherwise there was no cardiac abnormality. The patient died with loss of speech, slight paralysis of the right cheek and right side of the tongue, and Cheyne-Stokes respiration. At the post-mortem examination the heart-muscle was found to be soft and flabby, and on microscopical examination showed well-marked fatty

degeneration. There were slight atheroma of the aorta and slight thickening of the cusps of the mitral valve. As in the previous case, the internal anterior thoracic nerve was found to be lying over the ribs where there had been tenderness to pressure during life. The sensory phenomena demonstrate the symptoms present in a very large number of patients. The article is a very suggestive one.

Auscultation.—Andrew H. Smith, of New York, ⁵⁹July 27, '96 recommends the use of the differential stethoscope in the study of cardiac murmurs. Although usually the auditory impressions made upon the two organs of hearing are blended together and are perceived by the sensorium as one, it is possible, by a little training, to acquire the power of separating them, compelling the sensorium, as it were, to take separate cognizance of the perceptions perceived through one ear, as distinguished from those received through the other. To do this, however, the sound-waves must reach the



DIFFERENTIAL STETHOSCOPE. (SMITH.)

Medical Record.

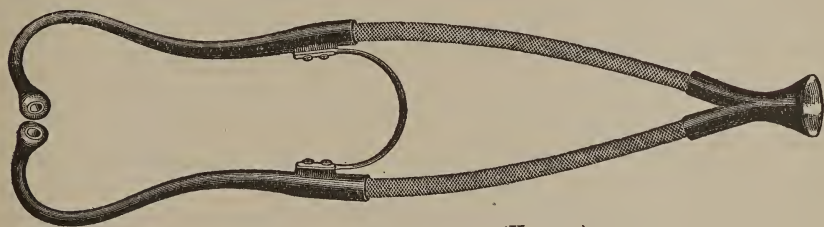
drum-membranes through different and distinct channels. This is effected by the differential stethoscope, which, in its simplest form, differs from the ordinary binaural instrument simply in having two thoracic extremities instead of one, each connected with its respective ear-piece. This arrangement enables us to hear separately two sounds produced at the same time in two localities more or less distant from each other. The successful use of the differential stethoscope requires a fairly acute and well-trained ear, with no difference in the hearing-power between one ear and the other. Some practice in this special form of auscultation may be necessary to acquire the power of giving separate yet simultaneous attention to the impressions which each ear receives.

A new stethoscope is described by Mark I. Knapp, of New York, ⁵⁹Nov. 9, '96 having for its object to arrest the humming sound collected by the metallic surfaces of such instruments. He therefore covered the metallic portions with soft-rubber tubing.

Stethoscopes presenting practical improvements over the instrument in general use were also contributed by R. K. Valentine, of Brooklyn, ⁵⁹_{Jan. 5, '95} and Sidney Yankauer. ¹_{Sept. 7, '95} The former is especially useful for patients whose chests are very sensitive even to the light pressure of a hard bell. In Yankauer's instrument the neck of the chest-piece is enlarged so that its area is equal to the sum of the areas of the two limbs. Here the column of sound, after undergoing a certain concentration, is divided by the spur and transmitted to the ear without any further change in volume.

Pulse.

Dicrotism.—Binet ¹⁴_{Dec. 18, '95} states that it is generally admitted that dicrotism of the pulse is indicative of a weak tension (Marey), but that the opinions expressed by authors are, nevertheless, quite contradictory. He has experimented upon the appearance of dicrotism by modifying the conditions of pressure upon the arterial



IMPROVED STETHOSCOPE. (KNAPP.)

Medical Record.

circulation without influencing the cardiac muscle. He thus obtained sphygmographic tracings with Mallion's apparatus by lifting the hand above the head and by lowering it. When the hand is lowered the dicrotism is augmented in intensity and duration. When the arm is raised the dicrotism diminishes and only appears on the tracing near the summit of the pulsation. In another series of experiments he studied the dicrotism while exerting compression of the artery, and found that during compression the dicrotism is quite pronounced during the first pulsations, while, on the contrary, it is progressively lowered in the later ones.

Spurious Tension.—William Ewart ²_{Oct. 6, '94} describes an easy test for true and spurious pulse-tension. In cases where free communication is kept up between the radial and the ulnar pulses through the palmar arch, the strong pulsation which continues to be felt even when heavy pressure is made on the radial artery by the finger is apt to convey an erroneous impression that the vessel still resists compression at a time when its channel has already

suffered complete obliteration. 1. If the forefinger (the nail of which must be short) be firmly applied to any radial pulse with the position *I*, a strong beat will be felt by the pulp of the finger, which faces toward the subject's elbow, while no pulsation will be perceived by the extreme finger-tip immediately below the nail, this portion of the finger facing toward the palm. 2. The position of the finger is then reversed to *II*, heavy pressure being this time avoided. The beat will be found to have changed sides and to have migrated from the proximal to the distal side of the finger. Free pulsation is still felt by the finger-pad in its new position, and very little or no pulsation is experienced by the finger-tip. 3. As soon, however, as pressure is increased, a fresh change occurs,—the distal beat disappears and the tip of the finger (pointing toward the elbow) becomes conscious of a strong pulsation on its proximal side. This shifting, or transfer, of the beat is the sign



AN EASY TEST FOR TRUE AND SPURIOUS PULSE-TENSION. (EWART.)

Illustrating the two positions of the finger applied to the pulse: *I*, pointing to the hand; *II*, pointing to the elbow of the subject; *R*, the head of the radius.

British Medical Journal.

which can be used as a reliable test that the artery has been successfully obliterated. The method, of which this is merely a practical demonstration, consists in keeping a single finger applied to the pulse in the usual position, and in gradually increasing its pressure till the change in question is brought about.

Tachycardia.—G. Laurenti⁵⁸⁹ describes a case of tachycardia of gastric origin which he considers was not due to a mechanical cause (compression of the vagus), but was of toxic origin and due to the absorption of ptomaines produced in the dilated stomach.

In commenting upon tachycardia at the menopause Frank Baldwin¹⁵⁷ states that two well-marked cases which have come under his observation lead him to believe that at the beginning of all attacks, when the cardiac contraction is perfect, the arteries are full, but, as the muscular fibre of the heart becomes fatigued by

the extra amount of work demanded, it fails to expel fully its contents into the vessels.

After an exhaustive study of tachycardia, Martius, of Rostock, ¹⁵_{Nov., '95} distinguishes between cases which reach a considerable acceleration, but not the highest, and which may entail some dilatation of the heart, and cases in which acceleration reaches the highest point (200 and over), and in which he believes acute dilatation to be the initial event.

Häusler ²¹⁴_{No. 22, '94} ¹¹²_{Sept., '95} reports two cases of tachycardia, the first of which is particularly interesting because of its periodicity, its rheumatic basis, and prompt action of quinine. A male, aged 54 years, who had previously had rheumatism in the winters of 1890, 1892, and 1894, was affected suddenly with præcordial anxiety and cardiac palpitation. The pulse was not countable; auscultation of the heart revealed 200 to 216 cardiac contractions per minute. There was no fever. Various remedies were used in vain, until the administration of quinine gave relief within a couple of hours. The second case was that of a female, aged 32 years, who, as a child, suffered with nervous palpitation of the heart. Following an attack of influenza, she became affected with a left-sided empyema, during the course of which there occurred sudden repeated attacks of tachycardia. Auscultation revealed cardiac contractions 248 to 252 per minute. Ice locally, counter-irritations, brandy, and other remedies were without effect. The administration of quinine, 3 grains (0.16 gramme) hourly, caused cessation of the attacks. The bromides also appear to have been of service in this case.

Isnel ²⁰⁰⁰_{'95} states that the application of the ice-bag to the præcordial region produces an increase of the systolic force by acting directly on the myocardium, an increase of the blood-pressure, diminution of the number of the cardiac pulsations, and the disappearance of irregularities of the pulse. It also favors the pulmonary circulation and the respiration.

In the tachycardia of the menopause Baldwin ¹⁵⁷_{Nov., '96} prepares a solution of nitrite of amyl 5 minims (0.32 gramme) to the ounce (31 grammes) of water, and directs the patient to take a teaspoonful every fifteen minutes until relieved.

H. Desplats, of Lille, ²²⁰_{No. 23, '95} ⁶⁷³_{Sept., '96} insists on the value of large doses of digitalis (0.75 gramme)—11½ grains—of the powder or 5 or 6 granules of digitaline) in essential paroxysmal tachycardia. He prefers this drug to treatment by milk diet and rest. Bromide of potassium, in daily doses of 5 grammes (1¼ drachms) given in the intervals, appeared, in his hands, to diminish the number and length of the attacks.

Bradycardia.—In an article on the causes of bradycardia Alexander Morrison ⁶_{Nov. 23, '96} considers it permissible to conclude that unknown, but not necessarily unknowable, changes in the nervous endowment of the heart are primarily causal of both transient and persistent bradycardia. This conclusion does not however, exclude the probable correctness of the opinion, based on clinical observation, that with a normal nerve-tissue, and even with a normal nerve-power, the blood-weight and muscular condition of the heart may be such as to prevent that ready response which occurs under more normal circumstances. In support of his opinion he quotes that in 3578 cases examined as to pulse-rate Grob found bradycardia to be habitual and normal—that is, physiological—in 6 cases, or in 0.17 per cent. All these occurred in men, whose ages varied from 25 to 65 and their pulse-rate from 44 to 58 or 60. An habitual pulse-rate of 60 is scarcely bradycardia, but is below the average rapidity. It is of incidental interest to mention in this connection, as Comby does on Corvisart's authority, that Napoleon I had an habitual pulse-rate of 40. The occasional epileptiform seizures which he is stated to have experienced may, in view of this fact, have been cardiac and syncopal rather than truly epileptic. The predominant rôle of the nervous system in influencing the pulse-rate is also argued by clinical experience, as shown by the acceleration or retardation, the rhythmical or irregular, and the partial or complete, arrest, for the moment, of the heart's action. In many, although not in all, such cases there is reason to believe that the cardiac muscle is healthy.

Hirtz and P. E. Lévy ¹⁰⁰_{Jan. 23, Feb. 7, 14, 21, '96} deny the direct influence of an alteration of the heart in these cases, and admit the secondary rôle of arterial hypertension in combination with generalized arterio-sclerosis. Bulbar anæmia may frequently be the cause, and the authors, in support of this opinion, cite several cases of chlorosis with slow pulse, the arterial tension being diminished in all. The arterio-sclerotic patients whom they have observed were all overworked and anæmic; the same condition exists in certain forms of beginning tuberculosis and during convalescence after rheumatism.

Rémond, of Metz, and Baylac ¹⁰⁸⁸_{Dec. 16, '96} report a case of permanent slow pulse with Cheyne-Stokes respiration and epileptiform attacks, and refer the permanent slow pulse in this case to excitation of the bulb by the toxic substances due to uræmia and carried by the blood.

A case evidently due to simple constipation is reported by M. M. Bowlan. ⁶_{Dec. 14, '95} This case was regarded as due to the absorption

of poisonous, effete, and fermentation products from the intestinal tract (whether ptomaines, leucomaines, or what not), and treated accordingly. There was no marked abdominal distension and very little vomiting; so that any local mechanical theory was out of the question.

In a case reported as continued bradycardia by F. V. Bouliou-bach, of Moscow, ⁶⁷³_{Sept., '96} the number of cardiac contractions fell to 14, and even 8, per minute, and sometimes the heart was entirely arrested for thirty seconds. Again, the attacks would resemble catalepsy, the heart- and pulse- beats being absent for forty-two seconds; the heart-beats would then reach 140 per minute, the pulse would gain in strength and become more regular, and, if the beats reached 34 to 38 per minute, it was reasonably certain that the attack would not be repeated; if they exceeded 40, a repetition might be expected within half an hour.

W. W. Claybaugh, of Dexter, Iowa, ¹_{Oct. 25, '96} reports a case in which the pulse persisted at the rate of from 36 to 40 during several months. Marked calcareous degeneration of the coronary artery was found at the autopsy.

General Therapeutics of Cardiac Diseases.

An interesting discussion on cardiac therapeutics took place at a meeting of the Edinburgh Medico-Chirurgical Society. T. R. Fraser ³⁶_{Apr., '96} stated that failure of cardiac tonics is to be expected (1) when the degeneration of the myocardium is so far advanced that adequate contraction of the heart cannot be originated; (2) in mechanical obstruction of the circulation caused by valve-leakage or stenosis so extreme that no possible increase in the strength of the heart's contractions can produce a sufficient circulation of blood; (3) in a combination of degeneration and of mechanical effects of valve-lesions, where each separately would be insufficient to cause failure, but where the combination is sufficient to do so. Conditions outside the heart—as lung-œdema, bronchitis, and pleuritic effusions—will also cause its failure.

G. W. Balfour ³⁶_{June, '96} stated that the one indication for the use of cardiac tonics was cardiac insufficiency, and the practitioner should use the drug with whose action he was most familiar. He had been rather disappointed in the use of strophanthus, probably owing to its want of action on the blood-vessels, the blood-supply of the heart not being so much increased as by digitalis, but uses iodide of potassium in doses of 2 or 3 grains (0.13 or 0.2 gramme), as it quiets the heart, apparently by preventing the action of digitalis on the arterioles. It is more permanent in action than nitrites or other drugs, and in moderate doses dilates arterioles, reduces

blood-pressure, and allows an aneurism to contract. Grainger Stewart found digitalis more successful than strophanthus; the latter, however, appeared better for an emergency. It was important not to use cardiac tonics if there were active changes going on in the heart. In such cases he preferred iodide of potassium.

Byrom Bramwell³⁶_{May, '95} considered the general aspect of cardiac therapeutics. The key to treatment is the condition of the heart-muscle. To ascertain its condition we must observe (1) the size of the heart; (2) whether hypertrophy or dilatation is predominant; (3) the way in which the heart is acting and contracting, whether forcibly, irregularly, and the like; (4) condition of the peripheral, arterial, venous, and capillary circulations; (5) the way in which circulation is carried on as indicated by absence or presence of dyspnœa, palpitation, cardiac pain, etc., during rest, or under strain; (6) the way in which the heart-muscle responds to tonic remedies. So long as compensation is well maintained the more powerful cardiac tonics, such as digitalis and strophanthus, are unnecessary and may be harmful. In temporary breakdowns of compensation the enfeebled right heart may be aided by digitalis, strophanthus, strychnine, alcohol, etc., and, if greatly engorged, the strain may be relieved by venesection. In cardiac cases of all kinds, after breakdown of compensation, the treatment has to be guided by the opinion as to the nature of the lesion and the condition of the heart-muscle.

The views of Balfour regarding the actual value of digitalis are given in a subsequent article.²_{Dec. 14, '95} In his opinion the profession is hampered in its use by the continued prevalence of the idea that it is a most powerful, but dangerous, sedative to the heart,—an idea that dates from days when digitalis was supposed to possess a number of distinct actions, all more or less antagonistic to one another. We know that digitalis is a tonic to the muscular fibre, and that it acts chiefly on the heart and on the muscular coat of the arterioles. From this action flow all the benefits we obtain from this drug, while any unpleasantness that may happen to follow its employment is due to the effects of an overdose, and for this the prescriber is to blame, and not the drug.

Digitalis in every form is absorbed with difficulty and only slowly excreted; hence if the dose be repeated at too short an interval the drug accumulates within the system, and, ere long, symptoms of poisoning appear. Unfortunately, for its own reputation, its sphere of usefulness lies among a class of cases in which sudden death is no uncommon occurrence, and for many a day any sudden death in a patient taking digitalis was always ascribed

to the cumulative action of the drug quite irrespective of the dose administered. Deaths from digitalis poisoning in those otherwise healthy are among the rarest of occurrences,—only a very few are on record.

The most suitable preparations of digitalis to employ are, first of all, the powdered leaves carefully prepared and not over a year old. The infusion ranks next to the powdered leaves; it seems to contain all the most active principles of the plant, and it lends itself readily to combination with vascular stimulants, which are so often necessary adjuncts to secure the full benefit of the remedy without discomfort to the patient.

Digitalis may be given with three objects in view: (1) to improve the nutrition of the myocardium and so augment the force of its contractions as well as the energy of the cardiac ganglia, (2) to contract dilated ventricles, and (3) to remove dropsy. It is chiefly of use, as Withering has pointed out, in those with feeble, intermitting pulses and soft and readily-pitting limbs. When the pulse is hard and cordy and the limbs tense and brawny, digitalis is of no use; we must, in such cases, lower the blood-pressure by free purgation and get some of the fluid away before the drug will act.

This view is independently supported by Horatio C. Wood, of Philadelphia,²²² Aug., '95 who recalls the fact that engorgement of the portal system is almost always present in cases of heart disease. What special success in the treatment of this class of cases he may have had is attributed to the fact that he has always recognized the value of mercurials. He considers mercurial purges and corrosive sublimate, given in long-continued, small doses, as of the greatest importance in these cases. One-fiftieth grain (0.0013 gramme) or even $\frac{1}{100}$ grain (0.00065 gramme) of corrosive sublimate, given with the tincture of the chloride of iron, will sometimes effect almost a revolution by aiding the true heart-tonics. The digitalis may lie in the alimentary canal, and that no effect is produced be wondered at. Mercurials, so to speak, aid in its digestion and absorption.

Wood does not think the preparation of digitalis used of much consequence, provided it has been made from a good drug. The better results supposed to have been obtained from the infusion are due to the larger proportionate doses. In acute endocarditis digitalis is rarely indicated; aconite and similar drugs should be employed. But as soon as the acute stage has passed it is absolutely important to begin the use of digitalis in small doses, given with great watchfulness. In some cases very large doses of digitalis have a pronounced and beneficial effect where smaller

doses have failed. He insists upon the necessity for cardiac rest, and doubts the value of cardiac gymnastics, mountain-climbing, etc., in true heart-failure. He does not think adonidine, cactus, convallaria, or others of the newer remedies of any real value, and has never had any satisfaction in the treatment of real heart trouble with any other cardiac drugs than nitroglycerin, strophanthus, and digitalis. Nitroglycerin dilates the vessels and lowers the arterial pressure. It has probably a momentary stimulant influence on the heart-muscle, but if the dose is exceeded in the slightest degree this stimulant action passes at once into one of intense depression.

Nitroglycerin acts only for a short time; so it should be given in small doses and at short intervals. It is only useful in the crisis of the attack, and is especially efficient if the attack take the form of angina pectoris. It probably acts by relaxing spasm. Strophanthus is a muscle-poison. The heart is more susceptible to its influence than the voluntary muscles; so in using the drug we get a stimulant effect on the heart before it acts on the other muscles. There is no reason to think that, like digitalis, it acts further as a tonic than as a stimulant. It is more distinctly diuretic than digitalis, much more prompt in its action, but less permanent.

William Murray, of Durham, Eng., ⁶_{Sept. 28, '96} also states that mercury possesses a value far beyond its supposed alterative action in cardiac diseases. Its special benefits are exercised in cases of dilated and hypertrophied heart. By means of it the thready, weak, rapid, and irregular pulse is made full, soft, regular, and slow, with manifest relief of such symptoms as dyspnœa, pectoral weight and tightness, and sensations of faintness. The "angina sine dolore" is often marvelously relieved and removed by 2 or 3 grains (0.13 or 0.2 gramme) of blue pill three times a day, and the severe forms of angina pectoris not infrequently disappear under its influence. While the nitrites, nitroglycerin, etc., afford temporary relief, this remedy is much more permanent in its effects. To give digitalis a fair chance it is absolutely necessary, in his opinion, to pave its way by preliminary doses of mercury and to foster its action by repeated doses. To emphasize this fact, A. Foxwell, of Birmingham, ⁶_{Oct. 5, '96} cites the case of a man with double aortic disease, with orthopnœa, ascites, and general œdema. He was given cardiac tonics for three days with no relief, the urine remaining at 20 ounces (620 cubic centimetres). One-third grain (0.02 gramme) of calomel was then administered every two hours; the urine at once rose to over 100 ounces (3100 cubic centimetres), and in ten days the œdema and orthopnœa were quite gone, the

heart was calm, and the pulse, which had been small and hard, was large and duly soft.

Huchard, of Paris, ¹⁴_{Sept. 25, '95} states that active intervention is too frequently delayed until degeneration of the myocardium renders the use of drugs futile. He emphasizes the importance of early medication with digitalis when there are (1) enfeeblement of cardiac pulsation, (2) lowering of arterial and rise of venous tension, (3) scarcity of urine, with peripheral œdema and visceral congestion. He never waits for proof of congestion of the viscera, but administers digitalis as soon as he observes perimalleolar, or, rather, pretibial, œdema in the evening. Before beginning the digitalis Huchard keeps his patient in bed and on partial or exclusive milk diet for a few days. On the second or third day he gives a purgative composed of calomel and scammony, and on the following morning he prescribes one massive dose of 40 or 50 drops of a 1 in 1000 solution of crystallized digitaline, which is the equivalent of $\frac{1}{85}$ grain (0.001 gramme) of crystallized digitaline corresponding to four or five times its weight of the amorphous variety. The effect of this single dose is apparent in a few hours, polyuria setting in with relief to all the symptoms. Potain also advocates this method.

Van Allen, of Madura, India, ¹⁸⁶_{Oct., '94} finds that when digitalis fails to act as a diuretic, the diuretic action may be powerfully increased by the addition of coca.

Finkelstein, ⁵⁸⁶_{June 13, '95} in commenting upon the diuretic action of calomel in ascites of cardiac origin, states that he has had under observation 16 cases (11 men and 5 women), of which number 8 had mitral incompetence, 2 aortic incompetence, and 6 mitral insufficiency complicated with stenosis of the left pulmonary artery. All of these patients had ascites, and calomel, either pure (0.03 gramme— $\frac{1}{2}$ grain) or with digitalis, was administered every two hours. The mouth was carefully looked after, and all of the patients put upon the same diet. The following results were obtained: (1) the quantity of urine was rapidly increased, sometimes reaching seven litres (quarts); (2) the albuminuria disappeared; (3) the reaction of the urine remained acid; (4) the blood-pressure progressively increased as the ascites diminished; (5) the patients improved rapidly and the œdema disappeared, but not definitely. Six weeks to three months later it re-appeared, but the calomel then seemed to have lost much of its effect. The author considers it as an excellent diuretic, particularly in ascites of cardiac origin.

J. E. Atkinson, of Baltimore, ¹⁰⁴_{Dec. 29, '94} calls attention to a phase of blood-letting in which it is of the highest, at times of life-saving, usefulness,—that is, the mechanical relief to be afforded

by the abstraction of blood in cases where the right side of the heart becomes engorged and overdistended in consequence of increased obstruction to the flow of blood through the lungs or left side of the heart,—a condition not rarely observed in intense bronchitis, especially when complicating emphysema, in pulmonary œdema, and in incompetence of the mitral valve or stenosis of the mitral orifice. Here the right ventricle becomes within a short time greatly overdistended and quite incompetent to overcome the resistance in front so as to empty its chamber. Its suddenly developed feebleness is out of proportion to that of the other ventricle. The blood-supply to the arteries is diminished, while the whole venous system becomes surcharged with blood. Characteristic symptoms quickly appear. The ventricular systole becomes enormously increased in frequency, but diminished in force. Arterial anæmia is shown by the frequent, compressible, unequal, and irregular pulse; venous hyperæmia by cyanosis, hepatic engorgement, dyspnœa, sweating, etc. If relief is not afforded, the patient may die speedily,—asphyxiated. In many cases, as in advanced mitral insufficiency or stenosis, the benefit from bleeding will be transitory, but in cases of pulmonary œdema and engorgement, etc., brilliant results may occasionally be obtained.

In referring to the treatment of morbus cordis by the iodides and other drugs which lower the blood-pressure A. Haig ⁸⁰ Sept. 10, '96 states that, in certain cases in which the whole of the circulatory trouble may be the result of more or less chronic contractions of arterioles and high blood-pressure, the obvious indication is to relax the arterioles and lower the blood-pressure. The danger after opium is that when the dose is reduced or left off there is a rebound with a very high blood-pressure. The iodides are in the same way followed by a rebound, but this rarely gives much trouble till they have been taken for weeks or perhaps months. The rebound after both opium and the iodides can be prevented by the same means,—namely, by giving short courses of sodium salicylate to carry off the accumulated uric acid, the cause of increased arterial tension. In the morbus cordis of middle or later life there are no more important drugs than these, which, like the iodides, relax the arterioles and lower the blood-pressure. On the other hand, such drugs as digitalis, which contract the arterioles and raise the blood-pressure, may do great harm.

Askanazy, of Königsberg, ³ Dec. 25, '95 states that the double salicylate of sodium and theobromine, or diuretin, has the effect of rapidly arresting asthmatic symptoms and attacks of angina pectoris in patients suffering from cardiac and renal lesions, and this independently of any diuretic action of the medicine. The author has

confirmed this statement in ten cases. This very favorable action of diuretin upon the asthma and angina of cardiac and nephritic patients depends, in his opinion, upon the theobromine, and not upon the salicylate of sodium contained in the diuretin. Indeed, while administering salicylate of sodium to his patients, the author has never observed that this agent exercised the slightest favorable influence upon the dyspnoea and the cardiac pain.

W. C. Krauss, of Buffalo, ⁸⁰_{May 15, '95} believes that in strychnine we have an ideal cardiac stimulant which not only acts upon the circulation, but upon respiration, digestion, and assimilation. It is especially indicated in the weak heart of pneumonia and febrile processes, given hypodermatically in $\frac{1}{30}$ to $\frac{1}{10}$ grain (0.002 to 0.006 gramme) doses, repeated until some sign of the drug is manifested. It is also useful to relieve the alarming symptoms which occur in surgical anæsthesia, in the cardiac weakness often associated with neurasthenia, and in that due to depressed nerve-force. Strophanthus is of great value as a cardiac sedative in that form of tachycardia so common in exophthalmic goitre. These two drugs will retain their supremacy because of their influence over the vital centres in the medulla, to which the various systems of the body look for support and encouragement.

Wilcox ⁵⁹_{Feb. 2, '95} ¹¹²_{Mar., '95} states that, in patients in whom the cardiac disease is secondary to disease of the arteries, vaso-constrictors are not indicated. In an under-compensated heart, irrespective of whatever valvular lesion may exist, these remedies can be used to regulate exactly the amount of work which the heart is made to perform. The author regards ergot as the most generally useful vaso-constrictor. The mode of employment in cases of cardiac disease, marked by a pulse of low tension and a tendency to passive congestions, has been to diminish the calibre of the arterioles by ergot, and to strengthen the heart, if rapid, by strophanthus or sparteine, which have slight action on the vaso-constrictors, the last hardly any. If the pulse is already slow, the heart can be stimulated by caffeine or, preferably, cactus, the last being inert unless made from the green plant. In these cases the writer has found, after years of clinical observation, that this process of bringing about compensation in relatively weak hearts was more easily accomplished, and in shorter time, and far more safely than by digitalis.

Experience has proven to Schilling, of Nuremberg, ³_{Sept. 25, '95} that hypodermatic injections of camphorated oil, frequently employed, particularly in Germany, to combat the phenomena of cardiac collapse during infectious diseases, especially pneumonia, are not given in sufficiently large doses to obtain the full therapeutic effect

which they are capable of determining. Instead of injecting, as is commonly done, 1 or 2 Pravaz syringefuls of camphorated oil at 10 per cent., the author administers 2 syringefuls at one time, about 1 gramme ($15\frac{1}{2}$ grains) of camphor, and repeats the same dose as required during the day. The action exerted upon the heart by this mode of treatment is remarkably efficacious and rapid, and does not cause any alarming symptoms in the brain or lungs.

[Fifteen grains of camphor at one time should be regarded as a maximum dose, especially when given subcutaneously. The capacity of an ordinary Pravaz syringe is about twelve minims.—E. N. W. and H. F. V.]

Whenever, in a child with infectious disease, the pulse becomes soft and frequent and the heart's actions feeble, ⁷³Sevestre ^{Dec. 22, '94} prescribes caffeine, which is also given before resorting to cold bathing, however satisfactory the pulse may be. Hypodermatic injections deep in the outer part of the thigh are preferred, and the following modification of Tanret's formula used:—

R Caffein.,	$\frac{1}{2}$ drachm	(2.000 grammes).
Sodii benzoat.,	36 grains	(2.330 grammes).
Aq. dest., q. s. ad	$2\frac{1}{2}$ drachms	(10.000 grammes).

One cubic centimetre (15 minims) contains 3 grains (0.2 gramme) of caffeine. The author injects as much as 3 grains (0.2 gramme) of caffeine in children of 5 years and upward, twice or thrice daily as required. When for any reason hypodermatic injections are undesirable, the following mixture may be used:—

R Caffein.,	āā	24 grains	(1.500 grammes).
Sodii benzoat.,		$\frac{3}{4}$ grain	(0.045 gramme).
Vanillin,		$1\frac{1}{4}$ ounces	(46.500 grammes).
Syrup. Tolutan.,		$2\frac{1}{2}$ fluidrachms	(10 000 grammes).
Rum,	ad	4 fluidounces	(124.000 grammes).

A half-ounce (16 grammes) equals 3 grains (0.2 gramme) caffeine. However administered, caffeine is well borne, though sometimes cerebral excitement has been observed.

John H. F. Broadbent ¹⁵_{May, '95} discussed the Schott method, which, as is known, consists of baths containing various mineral substances and free carbonic-acid gas in solution and of a series of graduated gentle exercises or gymnastics. The patient begins with a bath containing 1 per cent. of chloride of sodium and 1 per 1000 of chloride of calcium, freed from carbonic-acid gas and at a temperature of 92° to 95° F. (33.3° to 35° C.), lasting from six to eight minutes. As time goes on the proportion of solids and the duration of the bath should gradually be increased and the temperature gradually lowered, until eventually baths containing

free carbonic-acid gas and the full amount of mineral constituents are taken.

Schott's plan of giving exercises, or "movements with resistance," has, according to Wethered,²_{Nov.20,'94} given astonishing results. Each exercise is made extremely slowly and regularly, and is resisted by the doctor or trained attendant, who carefully regulates the degree of resistance in accordance with the condition of the patient. The effect of this method of treatment has been marked: the pulse becomes more regular and its volume increases, the rate is also diminished, and the area of cardiac dullness after half an hour's exercise is found to be diminished to an astonishing degree. These are facts dependent simply on the observation of the attendant; but the improvement is also marked in the general condition and reports of the patients themselves. Schott is of opinion that all forms of heart disease may derive benefit from this treatment, with the exception of cases of aneurism and those in which there is an advanced degree of arterio-capillary fibrosis with high tension; and, in Wethered's opinion, the benefit has not been overestimated.

Robert H. Babcock, of Chicago,¹_{Dec.20,'94} reports nineteen cases treated by the Schott method, and does not doubt that it may be dangerous in degenerative changes of the blood-vessels and of the myocardium,—such as aneurism and advanced arterio-sclerosis, acute softening, and great fatty degeneration of the heart, when rupture may result from heightened intra-vascular and intra-cardiac pressure. Chronic interstitial nephritis is not a contra-indication. In hypertrophied hearts the baths should not be given if the heart is adequate to the peripheral resistance to be overcome, but only when the cardiac energy is threatening to fail or has actually failed. A number of papers have been published in praise of the method, if under experienced supervision. Lauder Brunton assigned it a position intermediate between massage and the Oertel cure.

[The necessity for considering each individual case by itself has not been done away with by the promulgation of the Schott method. It is an advantage to have brought distinctly to our minds the possibility of relieving an overloaded heart by diverting the blood into the capillaries of the skin, and to know that there are gradations from absolute repose in bed to active voluntary exercise; but it is not necessary nor even safe to have these stimulating baths and opposed movements employed upon every cardiac sufferer. G. Herschell, of London,⁶_{Feb.15,'96} has been led by his own experience with patients to take a more conservative view of the Nauheim treatment than seems at this moment

to prevail. He hopes medical men will "pause before they introduce into their routine practice a method of treatment the effects of which are so little known and the indications for which are so imperfectly understood."—E. N. W. and H. F. V.]

Pericarditis.

Pathology.—It will be remembered that, eight years ago, Banti, of Florence, reported a case of uræmic pericarditis in which a scientifically complete examination failed to reveal the least trace of microbes. The pericarditis having occurred but a few days before death, the suggestion made by Baumgarten, that the micro-organisms had probably died before the pericardial fluids were examined, could hardly be accepted. Since then Banti⁸⁵⁴_{Nov., '04; Mar., '05} has reported three more cases, all of which showed absolutely sterile pericardial exudation. In the last two cases reported the blood and spleen were also examined, but with the same result. Beco⁸⁵⁴_{Oct. 23, '04} was also able to study this subject in a case in which pericarditis developed three days before death. At the autopsy large, white kidneys and sero-fibrinous pericarditis, with abundant lymph, were found. Cultivation experiments from the pericardial exudation were also absolutely negative, thus agreeing with Banti's cases. From the spleen, however, a pure culture of bacillus coli communis was obtained, this micro-organism having supposedly made its way into the tissues during life. Beco then conducted a series of experiments in which both ureters were tied in rabbits; pericarditis appeared in every case, although no irritant was applied to the pericardium, and the animals lived from four to six days. In no case were micro-organisms found by culture from the pericardial exudation. It thus appears that an aseptic or uræmic pericarditis may be set up without micro-organisms being present. The author, however, does not hold that micro-organisms cannot play a part in the disease.

Dissy,⁵⁸⁹_{May 1, '05} at the necropsy of a man of 68 years who died of uræmia, found slight increase in the pericardial fluid, which was opaque from contained cells and small, fibrinous floccules. Both layers of the pericardium had lost their smooth, glistening appearance, and presented small, reddish points, covered here and there with a layer of fibrinous material. The heart was hypertrophied, especially the left ventricle. No valvular lesion existed, but the aorta and coronary arteries were atheromatous. There was a small, white, granular kidney, with signs of extensive arteriosclerosis. Bacteriological examination of the pericardial fluid was negative. No micro-organism was found by any of the various methods employed. The subject as it now stands does not war-

rant a conclusion, especially since, as is shown by Charrin,³_{No. 42, '94} serous effusion can perfectly well be caused by toxins originating from bacteria in remote regions.

Péron¹⁴_{Nov. 23, '94} relates the case of a young man of 20 years who was attacked by septic bronchitis, and who, on the third day, presented a very abundant muco-purulent expectoration. Pericardial friction soon set in; the fever persisted at about 40° C. (104° F.). The patient sank and died. The autopsy revealed the existence of fetid pus in the pericardium. A suppurating gland was found in the subtracheal space, which might explain the relation between the infectious bronchitis and the pericarditis.

At the New York Pathological Society Ferguson⁵⁹_{Mar. 9, '96} presented a remarkable specimen of purulent pericarditis. On separating the right lung from the pericardium an area of lymph three centimetres in diameter was found between the pneumonic area in the lung and the pericardium, which at this point was involved so that microscopical sections showed the entire depth of the pericardium to be the seat of inflammation, from the lymph outside to the endothelium. Examination of the pus and cultures from it showed Fränkel's diplococcus in vast numbers.

Ellwood Oliver, of Albany, N. Y.,¹_{Jan. 19, '96} gives an account of a case of chronic adhesive pericarditis, with entire obliteration of the sac, not diagnosed before death.

J. Hobbs, of Bordeaux,¹⁸⁸_{Dec. 15, '95} treated a case in which there was sudden return to the normal position of a heart which had been fixed, by very old pleuro-pericardial adhesions, in the right side of the chest.

Diagnosis.—According to Josserand, of Lyons,³_{Nov. 3, '94} ²_{Dec. 8, '94} the friction-sound in pericarditis is often in arrear of the anatomical evolution of the disease, not being present until a longer or shorter period has elapsed. The following is, in his opinion, an early sign of real value. When, in the course of an acute articular rheumatism, comparative auscultation is made at the cardiac base in the aortic and pulmonary areas, it sometimes happens that the second sound in the pulmonary area is found to be more intense, louder, and more metallic; the opposite is the case in chronic aortitis, in which the sound is more marked on the right side of the sternum than on the left. Sometimes this difference is appreciable even by the hand, which perceives an exaggeration of the diastolic closure-shock of the pulmonary sigmoid valves. The existence of this sign should cause one to search carefully for a friction-sound, which will then often be detected when a superficial auscultation would have allowed it to escape notice; if not present, its more or less early appearance

may be predicted. This noisiness of the second sound is early and usually transitory; it precedes the friction-sound by from one to three days, and with few exceptions, is replaced by it. It is a sign proper to the initial congestive period, like the fine crepitation of pneumonia. Its anatomical explanation is, Jossereand thinks, that the heart-muscle at the base of the pulmonary artery is rendered congested, turgescient, more dense, and perhaps covered with fibrinous lymph, and thus amplifies to the ear the neighboring sigmoid sounds. This sign is important, first, in diagnosis, to enable one to decide between a friction-sound and an anæmic murmur or extra-cardiac sound, as it permits one to decide in favor of the friction-sound; secondly, as a sign that the heart is affected, with localization and intensity difficult to state precisely. It indicates the necessity for early revulsive medication.

In an interesting paper on accentuation of the pulmonary second, as an important sign in the diagnosis of pericarditis, Alfred S. Warthin, of Ann Arbor, ⁹ ²⁸² _{Apr. 13, '95; Sept., '95} states that in some cases he had observed murmurs simultaneously, though these would soon disappear, giving place to a characteristic friction-sound, heard best along the left border of the sternum; later effusion developed. When recovery took place all the signs of cardiac disturbance disappeared, and the writer concludes, therefore, that the signs present were all of a pericardial nature, the first evidence of onset being this accentuation of the second pulmonary note. He regards it as always an early sign, and emphasizes the necessity of making careful and repeated examinations of the heart whenever a basal murmur (apparently hæmic) is attended by accentuation of pulmonary second sound. Although appearing early in the disease, it is the last to disappear.

Walter Broadbent ⁶ ⁵⁹ _{July 27, '95; Aug. 17, '95} calls attention to a physical sign of adherent pericardium observed by him in four cases. In three cases there was abundant evidence of adhesion of the pericardium to the chest-wall as well as to the diaphragm, but in one the heart moved freely under the ribs and the lung expanded well over it. The sign consisted in a visible retraction, synchronous with the cardiac systole, of the left side of the back in the region of the eleventh and twelfth ribs, and in three of the cases there was also systolic retraction of less degree in the same region on the right side. In all the cases there was a definite history of pericarditis, and in three of them there were other conditions strongly suggesting an adherent pericardium. "The only means of causing this retraction on both sides," Broadbent says, "would seem to be the diaphragm, which, if pulled upon, would have more effect on the floating eleventh and twelfth ribs than on the other, more fixed,

ones." That the retraction should be observed more often on the left side than on the right is only what might naturally be expected from the fact that the adhesions are chiefly to the left of the middle line; the liver, also, which is often large in these cases, may, the writer thinks, restrain the movement on the right.

Treatment.—Allan T. Sloan described to the Edinburgh Medical Society ³⁶_{Feb., '96} a case in which the right ventricle was accidentally tapped during a hurried attempt at paracentesis of the pericardium, on a patient in extreme collapse, a woman 19 years old, in whom a sharp attack of facial erysipelas was followed by acute rheumatism, and, finally, by pericarditis with effusion. The needle was plunged into the fourth interspace, about half an inch to the left of the sternum and a little below the left nipple. From 8 to 10 ounces (250 to 310 cubic centimetres) of pure blood flowed rapidly into the bottle of the aspirator and then suddenly stopped. To his dismay, he found that he had penetrated a cavity of the heart. As he was slowly withdrawing the cannula the heart made first a feeble, irregular movement, then gave a sudden strenuous jump, and finally started to beat again. For an hour the patient seemed to suffer acutely; quantities of frothy mucus were half coughed, half vomited; the cheeks were first ashy gray, then purplish in hue; the pupils were dilated to their fullest extent; the running, following pulse was quite uncountable, and the patient had every appearance of one dying asphyxiated. A drachm (4 grammes) of ether was injected, with the result that the patient became maniacal, and, at Bramwell's suggestion, first $\frac{1}{6}$ and then another $\frac{1}{6}$ grain (0.01 gramme) of morphia was administered hypodermatically to keep her quiet. This treatment was soon followed by marked improvement. Under free stimulation with brandy and champagne the improvement continued, and, two days after the operation, the temperature fell to normal and the pulse to 40. Within two months the patient was well enough to be sent into the country, and six months later was in perfect health. The cure of a case of acute rheumatic pericarditis, apparently of septic origin, by draining off ten ounces of blood directly from the heart is certainly a novelty in therapeutics.

Percy Kidd ⁶_{v.1,p.275,'96} records a case in which paracentesis of the pericardium appeared to act beneficially. After the second aspiration, when 28 ounces (870 grammes) of fluid were removed, the good effect of relieving pressure upon the heart was shown by increase in the amount of urine and by the dyspnoea being less marked. The case was brought before the Medical Society of London, where Sansom and other speakers ²_{v.1,p.262,'96} showed that they were not very favorable to the operation. Sansom drew attention

to the fact that it must be remembered that death in pericarditis with effusion is not, in all probability, brought about by the pressure of fluid upon the heart. The effusion is merely the evidence of a serious heart affection that kills only too often without the presence of any fluid.

[In an editorial comment upon this discussion Fisher ¹³¹_{Mar., '95} states so extensive an effusion may sometimes be met with in the pericardial cavity that it would be impossible to mistake it for enlargement of the heart, while careful marking out of the area of dullness would distinguish it from a pleural effusion. Unfortunately such an effusion is most common in the later stages of chronic kidney disease, when permanent recovery or even prolonged improvement is almost hopeless; yet the danger of aspiration must be so small and the probability of giving relief so great that one would think it cannot but be advisable.]

In the discussion following the reading of the above papers Bramwell and Russell recalled cases in their practices in which pericardial paracentesis failed to save their cases. Gordon Sharp ²_{Mar. 29, '95} also reported a fatal termination in a case, although momentary relief was afforded.

Samuel West, of London, ²_{Mar. 30, '95} speaking of the spot to be chosen for the introduction of the needle, said that he has tapped the pericardium several times in unusual places, but that he always attacks the region near the base of the heart with misgiving and with extra care. With Gordon Sharp's conclusion, that pericardial effusions of rheumatic origin do not as a rule require paracentesis, he quite agrees. He has seen very large effusions spontaneously disappear almost as rapidly as they developed. For all that, paracentesis will be necessary in some instances, and in a large number of cases in which paracentesis pericardii has been performed with success and recovery the effusion has been of rheumatic origin. The use of the ordinary trocar and cannula of the aspirator in the third intercostal space would be attended with extra risk. In the only fatal result he has seen, though not a case of his own, the puncture was made in this place with the ordinary trocar and cannula. The trocar, which projected as usual about one-third of an inch beyond the cannula, reached the heart, and the patient died from hæmorrhage into the pericardium within a few minutes of the operation. An aspirator is hardly ever necessary for paracentesis pericardii, for the fluid is under pressure and flows away readily enough. A sharp, hollow needle is much to be preferred to any form of trocar and cannula. Such a needle can be passed quite easily and quietly through the chest-walls without any undue force, and is

much more under control than any trocar and cannula can be, for this often sticks at the collar at the end of the cannula, and requires so much force to drive it through that it is likely to jump and go farther in than is intended. This is what occurred in the case just referred to; though the cannula was only well within the sac, the trocar reached the heart and caused laceration in the left auricle. He has, he states, never had such an accident himself, possibly because he has always used a sharp, hollow needle and gone very steadily and carefully to work.

[One advantage of the cannula is that, its extremity being blunt, there is no danger of scratching the surface of the constantly moving heart as the pericardial cavity gradually empties itself and contracts.—E. N. W. and H. F. V.]

Indurative Mediastino-Pericarditis.

Thomas Harris, of Manchester, ⁵_{Nov., Dec., '94; Jan., '95} has collected all the recorded cases (22) of indurative mediastino-pericarditis, and adds 3 cases of his own. Post-mortem, two varieties of the affection can be distinguished,—one with adherent pericardium and marked increase of the fibrous tissue in the mediastinum, sometimes completely filling it; the exterior of the pericardium is closely adherent to the surrounding parts; this is the indurative mediastino-pericarditis. In the other variety there is an adherent pericardium with thickening of the sac, adhesion to the surrounding parts, but little or no general mediastinitis. There are, in addition, rare instances, forming a third group, in which, without pericarditis, there is an increase in the fibrous tissues of the mediastinum,—a chronic mediastinitis. Of the 22 cases which he has collected, 9 occurred in persons under 18 years of age, only 2 in persons over 30; 17 cases were in males and 5 in females. Usually there was a history of some acute illness,—generally pericarditis. Some of the cases are tuberculous.

The symptoms indicative of the indurative mediastino-pericarditis develop at a late period; in many instances the onset is very insidious. The symptoms have been chiefly dyspnoea, venous engorgement, cyanosis, cardiac enlargement, increase in the size of the liver, and general dropsy or ascites, with the pulsus paradoxus and inspiratory swelling of the vessels of the neck. In some cases the posture has been suggestive, as Jaccoud mentions,—the patient sits up in bed with trunk bent forward; but this, after all, is not an uncommon position in cases of pericarditis with effusion. The duration of the cases varies. It is often difficult to say when the affection began. The period from the onset of symptoms which may be attributed to the affection to the fatal

termination varies from a few months to several years. The cause of death is usually a gradual cardiac dilatation, or, in the tuberculous cases, an acute general infection. The ascites which occurs in these cases, and which may be unaccompanied by general anasarca, is due sometimes to a peritonitis with chronic capsulitis and deformity of the liver.

DISEASES OF THE ARTERIES AND VEINS.

Atheroma.

Theodore Fisher¹³¹_{Mar., '96} ably reviews a paper by Ainslie Hollis upon the pathology of atheroma, in which the latter states²⁴⁷_{v.3, p.1, '94} that small-cell infiltration always precedes the degenerative changes and that the disease is probably microbic in origin. Lancereaux had already attributed at least one form of atheroma of the aorta to infection from without (see ANNUAL, 1894, vol. i, B-39),—viz., malaria. The form to which Lancereaux refers is most commonly situated just above the aortic valves, but may occur in well-defined, raised patches over a considerable area. This form, which is generally attributed to syphilis, shows small-cell infiltration of the vessel-wall in the early stages. On reading Hollis's paper, says Theodore Fisher¹³¹_{Mar., '96} one cannot help thinking that he has failed to differentiate this form from the variety that mainly affects the internal coat. He found a history of syphilis in only 3 of 52 cases, yet a glance through these cases shows that several are of the nature which Lancereaux attributes to malaria, and which others would consider due to syphilis. On the other hand, it may be remarked that, of 9 cases noticed in the Guy's Hospital records in which the disease was well marked and of this localized character, 5 gave post-mortem evidence of syphilis or had a history of venereal disease, while only 2 had been abroad. In 1 case of severe atheroma, just above the valves, seen in the Bristol General Hospital, there was also a history of gonorrhœa, which always suggests the possibility of syphilis. The pathology of this form is of some importance, since its consequences—such as aneurism, aortic regurgitation, and angina pectoris—are so serious. Lancereaux³⁶⁰_{Aug., '94} is quoted as considering that the most severe forms of cardiac pain are due to disease of the aorta just above the aortic valves, and that the nerves of the cardiac plexus running in the sheath of the vessel become affected. Although Lancereaux attributes the disease of the aorta that gives rise to the pain to malaria, he considers that iodide of potassium is the best remedy. It follows, then, that, whether we consider the disease to be due to syphilis or not, it may be well to bear in mind that, when a comparatively

young or middle-aged man comes under observation complaining of cardiac pain, and on auscultation a high-pitched or somewhat clanging aortic second sound is heard, suggesting some dilatation of the aorta just above the valves, iodide of potassium may possibly prove beneficial. In connection with this use of iodide of potassium it is noteworthy that Fraser, of Edinburgh, ²_{v.1, p.368, '06} lays stress upon the value of the drug in cases of aortic-valve disease. Aortic-valve disease and atheroma of the aorta in the neighborhood of the valves are often intimately associated, and clinically it may be impossible to say whether the lesion is primarily one of the artery or of the valves.

Lauder Brunton, of London, ⁶_{Oct.12, '06} reviewed the subject before the Cardiff Medical Society, and emphasized the importance of massage in these cases, the effect of which, upon muscle, is simply to imitate artificially the process by which waste-products are naturally removed from it. Brunton even believes that atheroma can be remedied permanently, and sums up the entire series of therapeutic indications as follows: Water-drinking and passive and active graduated exercise.

Arteritis and Periarteritis.

Experimental arteritis of microbic origin has been studied in an article by B. Pernice, ²¹⁴⁹_{'06} who states that, in experimental infection by the staphylococcus aureus, as well as in that produced by the anthrax or diphtheria bacillus, a more or less serious inflammation of the arteries is found. This alteration is seen with the microscope rather than with the naked eye, and is always more pronounced in the external coat; it seems to begin in the vasa vasorum, but in serious cases often involves all the coats of the diseased vessel. This arteritis may be produced solely by the action of the infecting virus, without any other predisposing cause; it seems due both to the action of the bacteria and to that of the microbic poisons, but the first cause is the most active. The histological characteristics of infectious arteritis resemble in certain respects those of chronic endarteritis in man; so that infectious diseases may be considered as the starting-point of endarteritis in the majority of cases, at least.

At a meeting of the Edinburgh Medico-Chirurgical Society Alexander Bruce ³⁶_{Oct., '04} read a paper on syphilitic nodose periarteritis, showing the etiological relationship of some of the forms of this affection to constitutional syphilis. From an examination of these cases, and a comparison of them with those described by the writer of this paper, the changes in the outer coat may be divided into three pretty distinct groups: (1) the outer coat is infiltrated

more or less uniformly with round cells, but without any, or any markedly evident, tendency to degeneration; (2) the outer coat shows a nodular (or a diffuse) cellular infiltration, with commencing caseation; (3) the outer coat shows a distinct formation of caseous gummata, as well as diffuse periarteritis.

The symptoms of periarteritis nodosa are most various, and the progress of the disease may be one of extreme rapidity or one lasting for weeks or months. Some of the cases have showed marked and rapid improvement under specific treatment, followed by relapses which have proved speedily fatal. Frequently there are no special premonitory symptoms; or there may be headache, giddiness, or pains in the region of the head and neck. Then there may develop, more or less suddenly, symptoms of mania, convulsions, unconsciousness, paresis or paralysis of the muscles supplied by the various cranial nerves, hemiparesis of arm and leg, complete hemiplegia, or paraplegia. These conditions are the same as those found with ordinary obliterative endarteritis and its complications, and are probably to be associated with periarteritis and periphlebitis only when they occur comparatively soon after the disease is contracted.

With regard to treatment, the history of these cases emphasizes the urgent need for persevering with the specific remedies for long periods after the early nervous symptoms have disappeared.

Kahlden⁷⁶⁸_{B.15,p.581} states that nodular periarteritis begins with a proliferation of the endothelium, which perforates the elastic layer and the mucous membrane in various places, and frequently assumes the form of mucous tissue with long, ramified, and stellate cells. The rest of the elastic layer then disappears very rapidly by softening and necrobiosis, while some of the fascicles of the muscular fibres remain for a long time, but finally disappear in the endothelial proliferation. While this process is taking place in the internal membranes, the tunica adventitia becomes infiltrated with round cells, for the most part mononuclear, and hypertrophies to from six to ten times its normal thickness, while at the same time the endothelial proliferation narrows to a greater or lesser extent the lumen of the vessel.

Arterio-sclerosis.

Kisch⁵⁷_{No.24,p.371,'95}; ⁸¹⁴_{Nov.1,'95} states that early arterio-sclerosis is one of the most common symptoms in severe general lipomatosis. In obese individuals the arterio-sclerotic change of the vessels, which shows itself by a decrease in the elasticity of the walls of the vessels and a diminution of the contractility of the smooth muscle-fibres, is found more frequently and in an earlier period of life

than normally. Kisch has made a large number of sphygmographic observations, and has thereby frequently been able to note the first symptoms of an increased arterial tension, showing a commencing arterio-sclerosis.

Tschigajew⁵⁸⁶_{No. 15, '96} asserts that a marked difference may be noted in the effect of muscular work on the workman in the field and the workman confined in a heavy atmosphere, with small intervals of repose. In the diagnosis of arterio-sclerosis the author believes that the following points should be borne in mind: (1) the possibility of a physiological sclerosis, in the majority of cases in old age; (2) a transitory stage of false arterio-sclerosis in the development of some forms of real sclerosis; (3) pathological changes in the vessel-walls, due to former diseases or to increased blood-pressure, and frequently present even in youth; (4) increased blood-pressure under muscular work and varying at different hours of the day; (5) height of the blood-pressure; (6) the frequency of pulse and respiration, which is not parallel to the blood-pressure, but depends on individual peculiarities, on the kind of work, and the quality and quantity of food. (Report of Corresponding Editor Szadek, of Kiew.)

Frank Billings⁴⁵¹_{May, '96} states that negroes seem to be particularly susceptible to this affection.

[It is remarkable how much good iodide of potash will do the average negro.—E. N. W. and H. F. V.]

Aortitis.

In commenting upon pain in chronic aortitis V. Martin-Durr states¹⁵²_{Aug. 9, '96} that at the outset the painful symptoms are limited to a temporary sensation of oppression and præcordial heaviness after exertion. Later on there are usually attacks of retrosternal pain, though sometimes this is absent; so that death may occur suddenly through rupture of the aortic walls, without any cardiac symptoms having been previously noticed by the patient. There may also be an agonizing anxiety with normal respiration. The author concludes that chronic aortitis is usually an affection the diagnosis of which requires considerable investigation. The functional symptoms may merely indicate the existence of an aortic lesion, but the physical symptoms are such as to readily determine the nature of the affection. There are two such symptoms: first, increased dullness at the level of the second intercostal space at the right of the sternum, which indicates the enlargement of the aorta in a transverse direction; and, secondly, an elevation of the right subclavian, showing enlargement of the aorta longitudinally. These two symptoms are absolutely pathognomonic; modifica-

tions of the second heart-sound are of secondary value, for they mainly indicate the condition of the valves, and valvular lesion is not a necessary function in chronic alteration of the vascular coats.

Potain ³_{Nov. 20, '96} devoted a clinical lecture to a case of hysterical paralysis in a subject attacked by chronic aortitis with dilatation of the aortic arch. Hysteria during the course of cardiac affections is relatively frequent, and, while in a number of cases cardiac diseases follow nervous affections of various kinds, it is none the less true that nervous troubles often present themselves during the evolution of a cardiopathy. Among these nervous manifestations cerebral disturbances are certainly the most frequent; mental troubles, for instance, are commonly met with, while convulsive or paralytic disturbances are more rarely observed. All these conditions are less frequent in aortic lesions, no doubt because the majority of subjects thus affected are old people, in whom the nervous reactions are, in general, diminished. Hysteria is observed in patients suffering from heart affections, but all the cases so far published occurred in connection with mitral affections, particularly stenosis; in none was there an aortic affection. Now, the aorta is the starting-point of powerful reflexes which have been made known by François-Franck, and the symptoms of aortitis are often imputable to reflex phenomena; it is, consequently, not surprising that under these circumstances hysterical affections present themselves to which, perhaps, the patient may have been hereditarily predisposed.

Aneurism.

Aneurism of the Heart.—At a meeting of the New York Pathological Society Loomis ⁵⁹_{Feb. 23, '96} presented a specimen of aneurism of the left ventricle of a fibroid heart. On opening this ventricle an aneurism was found to have burrowed nearly through the wall of the heart, leaving only about one-twelfth of an inch of muscle-fibre intact. The diameter of the aneurismal pouch was about an inch and a quarter. Scattered through the hypertrophied wall of the left ventricle were white patches. One of these was as large as a cherry, and presented almost the appearance of a distinct tumor. Microscopical examination of a number of sections made through these patches, and through portions of the cardiac wall that appeared to be normal, revealed the lesions of a very widely disseminated and advanced interstitial myocarditis, which had entirely destroyed the muscle-fibres in the white areas. The thin portion of the aneurismal sac was fibrous tissue, with only a few heart-fibres seen among the connective tissue.

A case of aneurism of the heart reported by Embley, of Melbourne,⁴⁵¹_{Dec., '95} presented an increased area of cardiac dullness and the presence, on auscultation, of a musical sound, quite distinct from the normal sounds and obscuring them. This sound was humming in character, high in pitch, continuous throughout the entire cardiac cycle, rising in systole and falling in diastole, and audible from apex to base, but loudest at the apex. The distinctly uninterrupted continuity, the easy rise and fall, the absence of see-saw indications of a backward and forward flow, and the high pitch of the musical sound denoted a small tag of substance vibrating in a continuous current and increasing in the intensity of its vibrations with the increase of intra-cardiac pressure. The patient died, and at the necropsy a small, ragged opening was found in the posterior wall of the left ventricle, in an aneurismal dilatation of the wall of the ventricle. In the light of the autopsy the explanation of the abnormal sound is easy. The unemptied portion of the heart, in which the gyrations of blood occurred that caused the continuous vibrations, was the aneurismal dilatation, in the thin wall of which the perforation occurred. Although the presence of a tag of substance, so situated in the aneurismal sac as to vibrate in the above-mentioned manner, is rare, yet, when it is met with, it should indicate a heart-cavity unemptied at the end of its systole and an aneurism.

Emile Sargent³⁶⁰_{Nov., '94} states that two conditions are necessary for the formation of aneurisms of the sigmoid valve,—viz., inflammation of the affected valve (acute or chronic aortitis) and pressure of the blood upon the affected point, causing depression of the sac. Acute aortitis, according to Virchow and Ponfick, predisposes, as a rule, to general distension of the valve, and chronic aortitis to true aneurism,—that is, more circumscribed inflammation and increase of arterial tension. The principle cause is atheroma. These aneurisms compromise the aortic orifice, and cause either stricture or insufficiency, or both, if these do not already exist, or either alternately. When rupture occurs a musical murmur is heard, the appearance of which, following on the previous murmurs, will aid in the diagnosis. These aneurisms may be complicated with aneurisms of other valves of the same or another orifice, either by propagation or from concomitant endocarditis. It may give rise to emboli, either by favoring the production of clots on its surface or within its cavity or by the presence of *débris* after rupture.

Schwalbe, of Berlin,³_{Dec. 25, '96} gives an account of a case of aneurism of the heart with sudden death. At the autopsy an aneurism of the left ventricle was found with a rupture about three centimetres long. The heart was very large and weighed much more

than the normal heart of adult man. The enormous hypertrophy was hidden during life by the interposition of the lung. The pericardium was filled with coagulated blood. The aorta was sclerotic throughout a considerable portion of its length. A case of aneurism of the left auricle was described by J. Dreschfeld, of Manchester ⁹⁰_{July, '95}; aneurismal dilatation of the anterior wall of one of the ventricles by Gouget ¹¹⁵³_{Apr. 10, '95}; one of the apex by Marie and Rabé ¹¹⁵³_{Apr. 10, '95} in which there was infarct from obliteration of the coronary artery, and one of the apex following an apoplectic seizure, by Claude. ¹¹⁵³_{Apr. 10, '95}

Arterial Aneurism.—J. B. Duplaix ²¹⁵⁰_{'95} considers aneurism to be solely a consequence of alteration of the arterial walls, particularly of arteritis, which would explain the localization of the tumors either on the vessels of large calibre or on the smaller ones, as well as the fact that they are usually observed in men and after the age of 50. Alcoholism, rather than the race, accounts for the great frequency of this affection in certain countries. The localization of the disease frequently depends upon the profession of the patient. Traumatism is only an occasional cause, when the vascular walls have been previously altered by inflammation or cicatrices. Generally speaking, arterio-sclerosis, as has been demonstrated by Cornil and Ranvier, is the most important factor in the frequent occurrence of aneurisms in alcoholic and syphilitic subjects. From the anatomo-pathological point of view, the old classification as “mixed-internal,” “mixed-external,” “cystogenic,” and “dissecting” aneurisms does not exist. The localization of the aneurism in the arterial coats depends upon the more or less advanced degree of the sclerosis or of the atheroma. In the structure of the sac, whatever be its form, it is impossible to find anything but sclerotic tissue. Inflammation of the wall allows of the coagulation of the blood and the formation of hard, fibrinous clots. The passive clots are formed, as has been shown by Broca, by the stagnation of blood in the sac.

A. Frænkel ⁵⁹_{Nov. 17, '94} remarks on the part played by syphilis in the etiology of aneurisms. Walsh thought that 60 per cent. of true aneurisms were due to syphilis; others think still more. Frænkel himself, during the last four years, has seen 19 cases of aneurism of the thoracic aorta in which there were necropsies; 3 cases were in women, 16 in men. Of the 19 patients 9—that is, 47 per cent.—had had syphilis, and these were all under 50 years of age. These illustrate the relation of precocious arterio-sclerosis and syphilis.

Aneurism of the Aorta.—P. Hampeln ⁴_{Dec. 24, '94} calls attention to a relatively frequent phenomenon in aneurisms of the aorta,—namely,

the repeated occurrence of hæmoptysis preceding the opening of the sac into the bronchial tubes, due to the existence of small communications between the aneurism and the latter. The author published a case of this kind two years ago, and the researches he has since made have enabled him to find only two analogous cases in literature,—that of Fürbringer and that of Wintermantel, in which hæmoptysis led to a diagnosis of tuberculosis, which was shown at the autopsy to be incorrect. Recently the author has observed a new case. The hæmoptysis set in suddenly and presented all the appearances of that observed in tuberculosis; but, as the patient also presented hæmothorax on the left side, Hampeln diagnosed aneurism of the aorta, which was confirmed at the autopsy.

Olivier was the first (1878) to describe an ascending motion of the trachea, simultaneous with the cardiac systole, in certain cases of aneurism of the aorta. This ascending tracheal movement, to which was recently added the lateral pulsation of Cardarelli, was for a long time considered as pathognomonic of aortic dilatation. Modern authors are no longer of this opinion, but Cavazzani⁵⁰⁵_{No. 84, '95} has succeeded in marking upon a tracing the tracheal pulse of Olivier corresponding to the radial pulse by means of a single apparatus consisting of a light lever oscillating vertically. He was thus enabled to demonstrate, in two cases of manifest aortic aneurisms, the actual existence of Olivier's sign. It is shown upon the tracing in the form of a slight ascension of the graphic line preceding that of the radial pulse. Feletti, of Catani,³_{Nov. 6, '95} observed, in two cases of aneurism of the arch of the aorta, a rhythmic shake of the head synchronous with the cardiac systole. The pulsations were the more energetic according as the patients held the head thrown backward. He attributes this phenomenon to the downward traction [W. S. Oliver's "tracheal tugging"—E. N. W. and H. F. V.] of the left bronchial tube and of the trachea by the aneurism at the time of each diastole. As these pulsations are always synchronous with the cardiac systole, they cannot be confounded with the rhythmic shocks by muscular contraction nor with the tremors noticeable in certain nervous affections.

Rupture of Thoracic Aneurisms.—F. W. Draper, of Boston,⁹⁹_{Mar. 14, '95} records 10 cases of sudden death due to the rupture of thoracic aneurisms previously unsuspected. Four of these cases occurred in women, the youngest being 37 and the oldest 75. Of the 6 men the youngest was 30 and the oldest was 77. The aneurisms were mostly small and occupied various positions in the arch and descending aorta, one being placed just above the diaphragm. There are among them examples of rupture of a fusiform aneu-

rism, also of a dissecting aneurism. The vertebræ were eroded in 3 cases. The author draws the following conclusions: 1. The rupture of the aneurism does not of necessity require physical exertion as an exciting cause. 2. The pericardium most often receives the escaping blood, and this leads to an inhibition of the cardiac action. 3. These deaths, although sudden, are not instantaneous, and sometimes a considerable period may intervene. 4. The death is not generally painful. 5. The escaping blood does not always follow the lines of least resistance. 6. Aneurisms of small size and fusiform in character may rupture suddenly. 7. Aneurism is not necessarily limited to advanced life.

Philip James, of Wellington, N. Z., ⁵⁵⁷_{Apr. 1, '95} observed a case in which death did not occur for five hours after the onset of the symptoms, which were severe abdominal pain and intense rectal tenesmus. An aortic aneurism was found at the necropsy to have burst into the pericardial sac through an opening three inches in diameter.

J. Nissim, of Paris, ⁷_{Oct., '94} had under his care a woman, aged 74 years, who, after the rupture of the horizontal portion of the arch of the aorta, following a fall, lived nine days. At the post-mortem examination a dissecting aneurism was found, and an effusion into the left pleura of 2575 grammes (2½ quarts) of blood. The localization of the atheroma in the horizontal portion of the aorta has been but rarely observed, Martin-Durr ³⁶⁰_{'91} finding it only twice in twenty-eight cases.

In a case of rupture of an aortic aneurism into the superior vena cava described by Alexander Bruce, of Edinburgh, ³⁶_{Apr., '95} the attending physicians had noticed that the point of greatest intensity of the murmur had suddenly risen from the third to the second cartilage. This was explained post-mortem by finding the two ulcers into the vena cava, the upper being of more recent formation.

T. Mitchell Prudden ⁵⁹_{Aug. 3, '95} presented, at the New York Pathological Society, a case of multiple aneurisms of the abdominal aorta and iliac arteries, with old and recent ruptures and absence of left common iliac. The marks of an extensive earlier rupture of the iliac, which had spontaneously healed, were especially interesting.

Treatment of Aneurisms.—A. T. Bristow, ¹⁵⁷_{Oct., '95} after an elaborate review of the present status with regard to treatment, concludes that investigation of the cases reported in which iodide of potassium has been of benefit does not sustain the credit accorded that drug as a curative agent. Balfour up to 1872 had published an account of twelve cases in which amelioration had been ef-

fectured by the administration of the drug. In not one of these cases was the aneurism reported as cured. The statement is simply that the pulsations became less vigorous, and that there was a diminution in the volume of the tumor, in one case leading to its almost complete disappearance. This, be it remembered, is the report of the most enthusiastic supporter of the iodide treatment. A number of other writers have also reported cases in which considerable improvement has followed the administration of this drug. The authentic cures are, however, few and far between. Barwell Holmes and Sir Wm. Gull report somewhat emphatically against the drug. Dujardin-Beaumetz said: "For my part, the more I examine into the cases in which I have obtained amelioration and even cures by iodide of potassium, the more I am convinced that this medicine acts not on the sacculated aneurism with a pouch . . . but on such cases as are simply cases of aortitis with dilatation of the vessel." All the potassium-salts are depressors of the heart's action, and when the fact is taken into consideration that the initial dose recommended by the promoters of this treatment is from 5 to 10 grains (0.32 to 0.65 gramme), to be increased until the patient is taking 90 to 400 grains (6 to 26 grammes) a day, it is not at all surprising that the pulsation of the tumor should diminish and as its nutrition is impaired with all the other tissues of the body, its size also.

Notwithstanding the adverse criticisms which have been made on the use of the iodide, Bristow thinks that, as it can do no immediate harm, it ought still to be tried, if not in all cases, at least in those where there is even a suspicion of syphilitic taint.

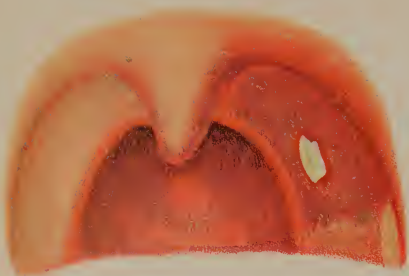
[It may further be said that the drug usually seems to promote the comfort of the patient,—a factor of considerable importance in the treatment of a chronic, incurable, and often distressing disease.—E. N. W. and H. F. V.]

Alexander James²_{June 29, '95} also states that all his observations contradict the assertion that iodide of potassium has the power of lowering the blood-pressure. With the sphygmomanometer he found that no marked lowering of the pressure occurs as the result of even the use of large doses, and alludes to a case in which he gradually increased the dose of the iodide till the patient was taking between 2 and 3 drachms (8 to 12 grammes) a day, and in whom careful sphygmomanometric examination showed no lowering of the blood-pressure.

S. Solis-Cohen, of Philadelphia,¹¹⁹_{July 6, '95} has obtained marked improvement from hydrated calcium chloride administered in doses of 1 drachm (4 grammes) daily.

In a case of rupture Broussolle³_{Apr. 10, '95} was able to arrest the

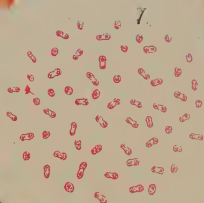
violent hæmorrhage by rapidly clearing the rupture of clots and dusting 4 grammes (1 drachm) of antipyrin on it. A pad of absorbent cotton was then placed on top, and retained by means of a bandage around the body. The antipyrin caused the immediate formation of a coagulum, which at first moderated and afterward completely checked the loss of blood. There was no recurrence of the hæmorrhage. The patient died forty-eight hours afterward from pulmonary complications.



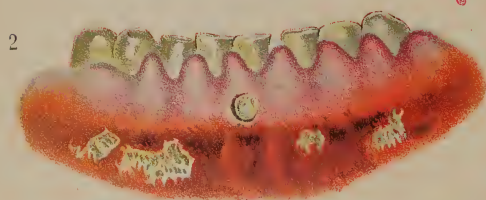
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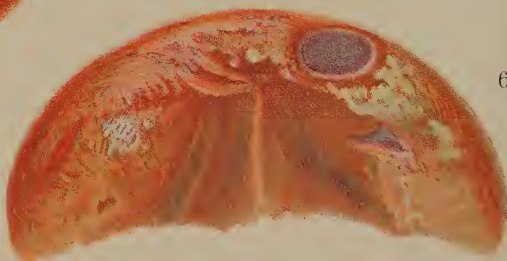
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Human Foot and Mouth Disease.(Siegel)
Archiv für Laryngologie.

DISEASES OF THE MOUTH, STOMACH, LIVER, AND PANCREAS.

BY THE CENTRAL EDITORIAL STAFF.

SUBMITTED FOR COMMENTATION TO

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DISEASES OF THE MOUTH.

Aphthous Stomatitis.

Etiology.—The controversy regarding the etiology of this affection was made particularly interesting this year by the discovery of a bacillus supposed to represent the specific organism of foot and mouth disease, which in the animal corresponds, or is supposed to correspond, with aphthous stomatitis in man. Siegel¹¹⁵¹ states that he was able to cultivate a bacillus from the mouth and faeces in grave cases during an epidemic in Berlin, and to cause the disease in other animals by inoculations. The bacillus is especially met with in the liver and spleen, generally during the first ten days, seldom later, and is rarely seen in the blood. It is a short rod or linked coccus from 0.5 to 0.7 μ in length, the coloring in the middle being much fainter than at the end. This coloring is unique, and prevents its being mistaken for other bacteria. It is not movable, and grows on gelatin plates without liquefaction, in the form of colonies, with sharp blue and white edges, which later change to a yellowish, shiny hue. In stab or scratch cultures no liquefaction occurs, but a soft, bluish film appears on the surface. It grows also on potato, blood-serum, and bouillon, the growth, however, being comparatively slow. It does not stain by Gram's method. Doves, cattle, pigs, and goats are susceptible to inoculation, though the production of external aphthous manifestations is not uniform.

Description of Colored Plate.—Figs. 1 and 1a. Characteristic solitary ulcers on the soft palate and lower lip, accompanied by slight general indisposition, both in young persons.

Fig. 2. Pronounced gingivitis and desquamation of the mucous membrane. Severe case, lasting eight weeks, in a woman 35 years old.

Fig. 3. Desquamation of the epithelium on the left side, consequent upon the

(C-1)

formation of ulcers, moderate swelling of the tongue with depression of the teeth, in a woman 23 years of age. Illness lasting four weeks.

Fig. 4. Atrophy of the gums preceded by gingivitis. Elderly man.

Fig. 5. Furrowed tongue, such as frequently exists after protracted glossitis.

Figs. 6a and 6b. Acute swelling of the tongue (natural size) with large ulcers. 6a shows the under side.

Fig. 7. The bacteria of the foot and mouth disease treated with carbol-fuchsin and highly colored.

In this connection, K. Winkelmann ^{301 673}_{B.39,H.1,2; Nov., '94} relates the case of a man of 46 years who, without apparent cause, was attacked with an exceedingly painful vesicular eruption of the right half of the tongue. The vesicles left behind them ulcerations which, in spite of all efforts to cause cicatrization, increased to such an extent as to involve the mucous membrane of the gums, mouth, and lips. These ulcerations were superficial, not indurated at the base, and bled at the slightest touch; they varied in size from that of a lentil to that of a pea. Ptyalism was present, but the sub-maxillary ganglia were not swollen. The urine contained neither sugar nor blood.

The condition of the patient grew slowly worse, and there appeared upon the skin of the feet and legs numerous petechiæ not larger than the head of a pin. The ulcerous process now invaded the pharynx and even the larynx, diarrhœa supervened, with symptoms of febrile bronchitis, and the patient died from exhaustion six months after the onset of the affection. A post-mortem was not permitted. Bacteriological examination of the mucous membrane during life showed the presence in the ulcerations of a microbe analogous to that of alcoholic fermentation, capable of culture in almost all media, and similar to that isolated by Siegel. Winkelmann believes that his case was of this nature, although the patient could not remember having been brought in contact with cows suffering from the affection, and although inoculations of the microbe into animals gave only negative results.

A. Petre ²⁰⁰⁰_{'94} and Renard ²¹²_{Mar.12,'95} sustain the theory that aphthous stomatitis is similar to and dependent upon the aphthous fever of cattle. The contagion is sometimes direct, but mostly indirect, through the milk of affected cows. Though not very serious in adults, this stomatitis is very dangerous in children. Three cases are described by Bézy and Iversenc, of Toulouse, ¹¹⁸_{June,'95} the first of which was that of a child infected by an abscess of the breast in the wet-nurse, the same bacillus being found in the milk and the false membrane in the child's mouth. In the second case stomatitis in the infant caused abscess of the breast in the nurse; while in the third pseudomembranous stomatitis in the child followed an abscess of the breast in the tuberculous mother.

Piana, of Mailand, and Fiorentino, of Pavia, ⁵⁰_{Apr.16,'95} from a



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series of careful researches are led to conclude, on the other hand, that the disease is not of microbic origin, they having found, in the fluid from the vesicles, the mucous membranes, and the blood, spherical bodies similar to the parasites of malaria. These bodies, highly refractive, are of three sizes: $\frac{1}{2}$ to 4 millimetres in diameter; 2 to 4 millimetres in diameter and containing one or more refractive granulations; or 3 to 4 millimetres and containing the same granulations grouped around a nucleus. Some of them have a pseudopode, others an amœboid motion, and they resemble in every way the parasite found by Schottelius and Behla in epizootic aphthæ, and considered by them as the pathogenic organism of the disease. The accompanying colored plate shows the appearance of these bodies.

Description of Colored Plate.—Fig. I. Fluid obtained from an aphthous vesicle in a pig's foot; *a*, free hyaline granules; *b*, granules with refractive nucleoli; *d*, granules with several refractive nucleoli; *g l c*, lymphatic cell containing a number of aphthous globules; *g r c*, red blood-cells with occasional granules located upon their upper surfaces; *g r b*, a red blood-cell containing an aphthous globule.

Fig. II Six various abnormal formations, noticed within an hour in an amœboid granule.

Fig. III. Twenty-four different abnormal formations of another amœboid granule, occurring in the space of an hour.

Fig. IV. Material scraped from the upper surface of an aphthous ulcer on the tongue of a ram, treated with a watery solution of methylene-blue, to which thymol had been added. The microparasites may also be seen, some entirely and some only partially colored. *m* represents a series of hyaline granules joined one to the other. During their researches they only once met with such a condition of aggregation of the granules of the foot and mouth disease. *v* shows several lymph-cells containing a number of colored globules.

[Marfan is quite convinced that the aphthous stomatitis of authors is nothing else than herpetic stomatitis. The latter, equally with herpetic angina, habitually assumes the pseudomembranous and diphtheroidal appearance. He also questions whether most of the cases described under the name of impetiginous stomatitis are not identical with herpetic stomatitis. He has never, in typical impetigo of the face, met with lesions of the buccal mucous membrane. The authors who describe an impetiginous stomatitis base themselves upon the co-existence of buccal and cutaneous lesions, which they ascribe to impetigo. In the cases, however, which have been brought forward as impetiginous stomatitis, Marfan believes it is easy to show that the cutaneous lesions are not those of impetigo, but of herpes disguised by scratching and secondary inoculations.]

Albert, ³_{June 15, '96} in an epidemic of benign stomatitis in an artillery corps of the French army, noted marked desquamation of the labial mucous membrane, both superior and inferior, with commissural fissures and red worm-like patches on the palate. These plaques bled easily, beginning on the lower lip and inoculating

the upper by contact. Experimental inoculation was entirely unsuccessful.

Treatment.—In stomatitis of herpetic origin, which he assimilates with the aphthous form, Marfan¹²¹_{June} states that the mouth must frequently be washed with a saturated boric-acid solution or a weak solution (1 to 500) of carbolic acid. It is also necessary to make direct applications to the ulcers. A 1 to 20 solution of nitrate of silver may be used or a 1 to 500 solution of permanganate of potassium. A solution of iodine and iodide of potassium in glycerin and water is also useful. In the ulcero-membranous variety the dried chloride of calcium is recommended, a little of the powder being deposited by the finger directly upon the lesions. In cases due to auto-intoxication J. I. Trussewitsch⁵⁷¹_{Feb., '95} regards sodium bicarbonate in medium-sized doses three or four hours after meals as the best prophylactic and curative agent.

MISCELLANEOUS DISEASES OF THE MOUTH.

Perforating Disease.—Baudet, of Paris,³⁶⁰_{Jan., '95} calls attention to this disease, first noted by Labbé in 1868, in which a progressive absorption of the alveolar arches takes place, the teeth dropping out together. Later on perforations of the palatine vault may occur, all these symptoms being unaccompanied by pain, hæmorrhage, or suppuration, until at last there appear one or two communications of the mouth with the nasal fossæ and the maxillary sinus. In a case seen by the author, in a man of 40 years, the teeth became gradually loosened and were removed by the man himself, abundant hæmorrhage taking place, and each tooth appearing healthy. The man suffered from right facial neuralgia, with tic douloureux, and for a period of three days, with œdema of the lips and chin. Besides the teeth he could easily remove bony fragments of the superior maxillary, some twenty such pieces being removed, until the alveolar border of the upper lip had entirely disappeared. The author ascribes such cases to tabetic disease, the nucleus of the fifth nerve or the nerve itself being involved.

Lymphatic Varices of the Buccal Mucous Membrane.—At a meeting of the French Society of Dermatology and Syphilography du Castel¹⁴_{July 14, '95}; ¹²¹_{July, '95} presented a patient suffering from lymphatic dilatations of the mucous membrane of the mouth consecutive to repeated attacks of erysipelas. The patient, a young man aged 20 years, had had since his tenth year at least ten attacks of erysipelas. The face remained swollen. Upon the mucous membrane of the lips and cheeks, on a level with the interdental spaces, small projections the size of a millet-seed and slightly acuminate

appeared, some of a whitish, opaline color, others absolutely transparent. There are small cysts, constituted by lymphatic dilations similar to those described by Tenneson in December, 1893, in a patient who had repeatedly suffered from erysipelas. The case again demonstrates the profound disorder which erysipelas may cause in the lymphatic circulation.

Tumors.—[Occasionally there are to be found in literature short notes on multiple papillomata met with on the buccal or nasal mucous membrane, chiefly in children. Rasch, of Copenhagen, ⁸⁷³ Nov. 14, '94 records two cases where many grayish-red, warty, or condylomatous growths were found on the inner side of the lower lips and cheeks, varying in size from a linseed to a lentil. The larger bled easily when touched or during mastication. They were cured by repeated applications of Paquelin's thermo-cautery. On searching for the cause it was found in the second case that the child was in the habit of sucking her thumb, on which she had an old-standing wart. In view of the admitted communicability of warts, Rasch suggests that the hands should always be inspected, both of infants and nurses, for the presence of warts in instances of papillomatous growths of a simple kind, of the nose, epiglottis, and larynx. The microscopical structure in the cases was identical with that of ordinary warts.—Corr. Ed. Levison, Copenhagen.]

H. Hopewell Smith, of Boston, Eng., ⁶ July 6, '96 discusses sarcoma of the peridental membrane, finds that this affection is not rare in its earlier forms, but that it is very seldom met with in an advanced condition; and that removal of the molar tooth fortunately cuts short its career if taken sufficiently early, but if it is allowed to continue it constitutes another starting-place for malignant disease of the maxillæ.

Buccal Pruritus.—Tommasoli ⁵⁷⁰ No. 3, '94; ¹ Sept. 7, '95 describes the case of a peasant woman, 33 years old, without anything remarkable in her history, who for four years had suffered with an itching and biting sensation in the cavity of the mouth, which compelled her to bite her tongue and to compress the mucous membrane of the cheeks between her teeth. The affection was aggravated in paroxysms, and occasionally she was entirely free from it. The chief situation of the abnormal sensation was in the tongue, which often bled from severe bites. Examination of the cavity of the mouth showed, on the mucous membrane of the cheeks, two whitish, almost horizontal and symmetrical stripes, which were nearly as long as the alveolar processes, to which they corresponded roughly in their course and of which a slight impression was to be seen. Beginning at the last molars, these stripes reached almost to the angles of the mouth. The epithelium on these stripes was moist

and soft, but apparently not destroyed. The whole looked like a linear zone of œdematous, swollen mucous membrane. Yet, on palpation, the stripes felt like cords, indolent and not yielding in the slightest to digital compression. All the rest of the mucous membrane, as well as the tongue, appeared sound. The author believes that this was a chronic paroxysmal paræsthesia of the buccal mucous membrane, giving rise to actual changes in those parts of the mucous membrane that were most affected. He finds analogues of this case in the paræsthesiæ of the anus and of the vulva which are commonly called pruritus; so he gives that name to the affection described by him.

MISCELLANEOUS DISEASES OF THE TONGUE.

Pseudosyphilitic Glossitis.—Mendel¹⁵²_{Nov. 23, '94} observed a case of syphilitic glossitis with lenticular leucoplasia which had lasted fifteen years. The patient had been syphilitic for twenty years. Improvement had followed energetic specific treatment, but relapse had taken place. The tongue was thickened, but gave little trouble. The furrow in the median line was very deep, and covered with numerous little elevations. On each side of this furrow, over a mucous surface which was very nearly natural, numerous spots existed of a grayish-white color, elongated or round and lenticular. These spots were slightly raised and seemed to be formed by the union of small exudative masses, over which the mucous membrane was grayish. Fournier, in the discussion, remarked on the difficulty of diagnosing the condition from simple leucoplasia and the hopelessness of treatment, owing to the certainty of recurrence. G. Frank Lydston, of Chicago,²⁴⁵_{Mar., '95} calls attention to the possibility of such leucoplasia becoming malignant, and questions whether they may properly be regarded as syphilitic or whether they are not simply manifestations of a debilitated system which might be due to other causes than syphilis, and which he has not found amenable to specific treatment.

Tuberculosis of the Tongue.—[Tubercular ulcerations of the tongue are but rarely limited to the tongue in persons manifesting no tubercular disease in other organs. The difficulty of recognizing such cases makes a knowledge of the symptomatology of considerable importance.] Wedenski⁵³⁰_{No. 3, '95} says, apropos of two cases observed by himself and one hundred and twelve collected from literature, that lingual tuberculosis appears in two forms,—the nodular in the thick portion of the tongue and the ulcerous form. Both may be either primary or secondary, rarely the former, and occur more frequently in man than in woman, from the age of 35 to 65 years. An early diagnosis is of great

importance as determining the proper line of treatment. The differential diagnosis must be made between carcinoma and syphilis, and microscopical examination of curetted or excised portions will aid in forming it. Should the case prove to be one of local tuberculosis, surgical intervention would be the most rational treatment, and the earlier this is resorted to the less the chances of recurrence. Even in the secondary form it may be of value by ridding the organism of an infectious area; while clinical observation has proven that it does not aggravate tuberculous conditions elsewhere.

Riga's Disease.—This affection has been observed almost exclusively in the southern provinces of Italy, where, according to Fede,²⁰¹⁵₉₄ it seems to be endemic, occasionally attacking all the children in a family; so that it has been considered by some to be an hereditary and congenital affection. On the other hand, it is observed when the first teeth make their appearance, apart from whooping-cough, sometimes in children whose general health shows nothing wrong, sometimes in cachectic children who are exhausted by ordinary attacks of gastro-intestinal catarrh. With regard to any point that the serious and the benign cases may have in common, which may be considered as the proper character of the disease, it is the production, at the level of the frænum of the tongue, of a prominent fungous excrescence covered with a whitish exudation diphtheritic in appearance. [F. Brun has published what he thinks is the first case thus far observed in France, and thinks it is rational to admit, judging from the results of the histological examination, that it is a local lesion, a sort of traumatic ulceration directly connected with the rubbing of the inferior surface of the tongue on the sharp edges of the two lower incisors, the repeated friction being considered as the probable cause of the papillary appearance of the ulceration. He also believes, with Fede, that Riga's disease must be more frequent in cachectics because their tissues are less resistant to the irritating causes, and because this disease only borrows an apparent gravity from the conditions under which it is sometimes produced.]

Tumors.—Vard H. Hulen, of New York, ¹_{Oct. 20, '95} describes a case of cavernous angioma of the tongue in a woman of 43 years, which has existed for twenty years, and causes no trouble except a slight impediment in speech. When the tongue is protruded the tumor measures 3.4 centimetres antero-posteriorly, 3.2 centimetres transversely, and 3.5 centimetres vertically. The cut on next page shows the position and general appearance of the neoplasm, which, according to the author, is of rare occurrence, but 32 such cases being recorded.

P. Vergely, of Bordeaux, ²⁵_{Feb., Mar., '95} devotes a long article to the discussion of lipoma of the tongue, apropos of a case observed in an old man who entered hospital for a chronic bronchitis, and whose tongue had been covered with a number of these growths for a period of ten years.

Foreign Bodies.—Derville, of Lille, ²²⁰_{June 29, '95} remarks that foreign bodies in the tongue may give rise to the appearance of serious troubles. For instance, in a case of his own, a man of 55, who presented a lesion of the tongue, the lateral situation, size, and



CAVERNOUS ANGEIOMA OF THE TONGUE. (HULEN.)

New York Medical Journal.

hardness of the lesion, the absence of functional phenomena, and the suspicious antecedents, if not of the patient, at least of the wife, all pointed to a syphilitic neoplasm, which very readily explained the error in diagnosis made by the physicians who first attended him. Derville extracted the foreign body, the stem of a pipe $2\frac{1}{2}$ centimetres long and 1 centimetre wide. Hémard, of Versailles, ²¹²_{Sept. 10, '95} observed a case in which a piece of pipe-stem about the same size remained in the tongue for eighteen months without giving rise to severe symptoms; and H. McKennan, of Paris,

Ill., ⁶¹June 15, '95 reports another instance in which the screw-end of the breech-pin of a shot-gun remained imbedded in a boy's tongue for fifty-four days. It was $1\frac{1}{2}$ inches long, $\frac{3}{4}$ inch broad, $\frac{1}{2}$ inch thick, and weighed $\frac{3}{4}$ ounce.

Leucoplakia.—Le Dentu ¹⁵Mar., '95 states that it is not unusual for plaques of leucoplakia to become epitheliomatous,—not that it is a normal phase of the disease, but it is sometimes induced by a tendency of leucoplakia to degeneration. Leucokeratosis should, therefore, be carefully watched for the development of papilloma or ulceration. As a local application for leucoplakia, S. Rosenberg ⁶⁹Sept. 13, '94 recommends iodide of potassium in a 20-per-cent. solution, painting it on the affected points. With this treatment he has seen leucoplakia disappear in a few days, after lasting for seven years and resisting all the usual methods. L. Leistikow ²⁸Oct. 1, '94 uses the following paste, applied with a swab:—

R Terræ siliceæ,	1.5 grammes (24 grains).
Resorcini,	3.0 grammes (48 grains).
Adipis,	0.5 gramme (8 grains).

After eight to fourteen days a shriveling is noticed, when the slightly-inflamed mucous membrane can be brought to a normal condition by balsam of Peru. The subject is also reviewed by Schiff, of Vienna, ⁸No. 8, '95 in a thorough article.

DISEASES OF THE STOMACH.

General Considerations.

Bacteriology.—[The doctrine of Bunge that the acids of the stomach exercise an antiseptic action has been so generally received that the other functions of these acids are almost cast into the shade. According to Bunge, hydrochloric acid possesses the power of destroying the micro-organisms introduced into the stomach by the food, and which, by setting up decomposition in the alimentary canal, destroy part of the aliment before it can be absorbed. These products when absorbed may cause troublesome symptoms, or even threaten life by setting up disease. If these statements are correct the acid of gastric juice must be a very efficient bacterial poison.] Kaufmann, of Strasburg, ⁴Feb. 11, 18, '95 however, finds that different micro-organisms behave differently in the presence of free hydrochloric acid. The cholera bacillus is very susceptible, the typhoid bacillus less so, and the tubercle bacillus and anthrax much less so. Generally speaking, the micro-organisms which decompose carbohydrates are less susceptible than those which decompose nitrogenous material, whereas those that cause lactic-acid fermentation

are the most resistant. Kaufmann, therefore, believes that under ordinary circumstances Bunge's doctrine of the action of hydrochloric acid suffices; but when we come to the prevention of disease fermentation other factors must come into play, because we find not infrequently that fermentation may not take place, although hydrochloric acid is absent; and, on the other hand, it may set in to a considerable degree where the acid is present in normal or even increased quantity. Of much importance in this respect is the motor activity of the stomach; and it has been shown, in many cases where acid is wanting in the stomach, that a compensatory factor exists in the greater activity of the stomach muscular power, which speedily passes on the food to the intestines. On the other hand, it has been proved that where there is stagnation fermentation may take place even if free hydrochloric acid is present in large quantity. In all the recorded cases of pathological fermentation in markedly acid stomachs there has been dilatation with stagnation. Kaufmann cites a case, however, which shows that it does not require gastric dilatation with stagnation to permit fermentation in spite of the presence of abundant hydrochloric acid, but that rather a much smaller degree of disturbance of the motor activity is sufficient. The patient had suffered from atony of the stomach with increased secretion of acid, which was abundantly present even in the fasting state. In the stomach, the motor activity of which was only moderately impaired, and notwithstanding a large proportion of free acid, there was a considerable increase of bacteria at all times. The microscopical examination always showed a bacterial fermentation, and this was confirmed by bacteriological culture. Besides the yeasts and sarcinæ and various bacilli which are inhabitants of water and readily succeed in getting into the stomach, there was a microbe resembling the bacillus coli communis which was certainly not usually met with. It differed from that bacillus in readily growing and thriving in the normal gastric juice with free hydrochloric acid. It was present at most of the examinations, even when the degree of acidity was high, and it flourished on acid agar. The chief interest of the case, however, was the existence of bacterial fermentation at the climax of digestion, even when there was a high percentage of hydrochloric acid.

Gilbert gave to the Société de Biologie¹⁴_{Nov. 14, '04} the results of some experiments made by him upon the rôle of hydrochloric acid upon the microbes of the stomach. He found that, although free hydrochloric acid might kill a great many of the organisms, it was devoid of this power when combined with the other elements of the gastric juice. Too much dependence should not, therefore, be

placed upon the microbicide action of the gastric juice in the normal state, and still less in hypopepsia and apepsia.

Chemistry.—In a study of the hydrochloric acid of the stomach, W. Schiele, of St. Petersburg, ²¹_{No.19,'95} concludes that hydrochloric acid is the only normal acid in the stomach; lactic acid is not, as was for a long time believed to be the case. Hydrochloric acid is freed from the chlorides of the blood in the lining-cells of the pepsin-glands, and, having become fixed by the albumin, is the one important and active agent in digestion, not the free acid. Free hydrochloric acid is worthless in digestion, and only appears after the acid has done its digestive work. The fixing of the acid by the albumin and the formation of an acid albuminate constitute a necessity in the action of the pepsin upon albumin. The peptonization of albumin is a minor function of the stomach.

The time of the appearance of free hydrochloric acid, says Penzoldt, ²²⁶_{B.53,II,3,4} depends, in health, with slight variation, on the quality and quantity of the food. The more albumin contained in a diet, the later does hydrochloric acid appear. The addition of a moderate amount of fluid to the meal (200 cubic centimetres—6½ ounces) accelerates the appearance of free acid. An experimental meal, consisting of 70 grammes (2¼ ounces) of white bread and 200 cubic centimetres (6½ fluidounces) of water, will, in normal cases, one hour after ingestion, enable the physician to demonstrate the presence of free hydrochloric acid. Uffelmann's test for lactic acid is, in Penzoldt's opinion, without practical value, as it yields no evidence of diagnostic importance. Soluble albuminoid bodies are rarely found during digestion, as they are at once absorbed, while peptonization begins in the stomach as soon as the albumin is broken up by the gastric juice. Sugar is rarely found after a diet rich in carbohydrates, as it is readily absorbed. The subject is reviewed by M. Gross, of New York ⁵⁹_{Oct.20,'94}; de Luna, of Marseilles ²⁰¹⁸_{'95}; Gürber, of Würzburg ²⁰¹⁹_{'95}; and Lescœur, of Paris. ³⁶⁰_{Jan., '95}

Zawadski ³¹⁹_{Dec.15,'94} and Boas ³¹⁹_{No.3,'95} discuss the presence of sulphuretted hydrogen in the stomach in disease. Boas states that the fermentation which results in the production of H₂S is absolutely independent of the amount of hydrochloric acid in the stomach-contents, and that it never occurs along with lactic-acid fermentation. He deduces, of course, from this, bearing in mind his dictum that the presence of lactic acid in any quantity is pathognomonic of cancer of the stomach, that H₂S is common in the gastric contents in gastrectasis, unless that be caused by malignant disease. Zawadski gives details of several cases in which he found large quantities of H₂S formed after food, where the patients suffered

from a dilated stomach. The degree of acidity present did not seem to affect its formation.

From observations covering four thousand cases, J. H. Kellogg, of Battle Creek, concludes ⁵⁹_{June 8, '95} that the failure to digest starch is one of the most common features in dyspeptics. He comments upon the large amount of sugar found present in the stomach-fluid, 7 or 8 drachms (27 to 30 grammes) per 100 cubic centimetres ($3\frac{1}{4}$ fluidounces) of stomach-fluid being frequent. He also notes the interesting relation between starch conversion and proteid digestion. He found six cases of complete apepsia in which there was no free hydrochloric acid in the stomach, and the co-efficient of proteid digestion was absolutely *nil*. According to his results, it requires the following quantities of different acids to neutralize completely the effect of the salivary action: Oxalic acid, 1 part to 10,000; hydrochloric acid, 1 part to 4000; lemon-juice, 1 part to 200; and vinegar, 1 part to 200.

Surmont and Brunelle ¹⁴_{Nov. 14, '94} examined the stomach-contents of a dog, one hour after a test-meal, both after repose and after enforced exercise, and found that there was always an increase in the total acidity and in the hydrochloric acidity after exercise. They believe, therefore, that repose should be ordered after a test-meal when the stomach-contents are to be examined.

Tests.—J. Friedenwald, of Baltimore, ⁵⁹_{Oct. 6, '94} regards the resorcin test of Boas as being not only quite as reliable for the detection of free hydrochloric acid as the phloroglucin test of Günzberg, but that it can be as well used for quantitative examinations as the latter and, perhaps, with greater advantage. Phloroglucin is quite unstable, and frequently decomposes when kept for some time, while the resorcin test may be kept for years in a dark-colored bottle without undergoing decomposition or in any way losing its sensitiveness. Resorcin can be bought at any pharmacy at a trifling cost, while phloroglucin-vanillin is a comparatively expensive substance, to be had only from the agents of the European manufacturers. The author has repeatedly used, with advantage, filter-paper dipped in Boas's reagent and allowed to dry to make the tests, in a manner similar to the phloroglucin test-paper of Rosenheim and Boas. A. L. Benedict, of Buffalo, ⁵⁹_{Nov. 17, '94} adds a word of praise for Boas's resorcin test, having used it for eighteen months and finding it sensitive and convenient. Morris Manges, of New York, ⁵⁹_{Feb. 2, '95} cannot agree with Friedenwald and Benedict as to the superiority of Boas's resorcin test over that of Günzberg, as he has found the latter to be more prompt and positive.

Friedenwald ⁵⁹_{Apr. 6, '95} has also tried the test by dimethylamidoazobenzol, introduced by Fisher and Philipp, ²⁰¹⁷_{Sec. 434} and finds it very

accurate and simple. Toepfer⁸³_{B.19,H.1} uses the reagent as follows: A 0.5-per-cent. alcoholic solution is prepared. Three to four drops of this solution are added to the gastric filtrate. If a reddish color is produced, free hydrochloric acid is present; if a yellowish discoloration, it is absent. For quantitative work, 5 to 10 cubic centimetres ($1\frac{1}{4}$ to $2\frac{1}{2}$ fluidrachms) of gastric filtrate are placed into a beaker. Three or four drops of the dimethylamidoazobenzol are added, and the mixture is then titrated with a decinormal sodium-hydrate solution until the reddish color entirely disappears and the fluid becomes yellowish. The number of cubic centimetres of $\frac{1}{10}$ normal NaOH employed in this process for 100 cubic centimetres ($3\frac{1}{4}$ fluidounces) of gastric filtrate, multiplied by 0.00365, equals the percentage of free hydrochloric acid present.

The following method is recommended by Mierzynski³¹⁹_{Nov.17,'94; Apr., '95}: Treat 5 to 20 cubic centimetres ($1\frac{1}{4}$ to 5 fluidrachms) of stomach-contents with barium carbonate, thus converting the latter into barium chloride, to which add a slight excess of ammonium monochromate. Treat the resulting barium chromate with hydrogen peroxide and dilute sulphuric acid, and measure the amount of oxygen, one atom of which equals half a molecule of hydrochloric acid. Wagner's azotometer was used by the author, corrections being made by means of a table for atmospheric pressure and temperature. Hugo Wiener³¹⁹_{Mar.23,'95} finds that the results obtained by this method and by the Sjöqvist-Jaksch method are remarkably similar; so that, while it may be available for clinical work, it cannot claim advantages in regard to simplicity.

A. L. Benedict, of Buffalo,⁹_{Feb.9,'95} made a series of experiments to determine the accuracy of the salol-test for gastric atony, which seems to him to prove that, although a chlorhydria may allow the rapid absorption of salol from the stomach, there are discrepancies sufficient to vitiate any possible value it may have, delay in the appearance of the test often appearing where least expected. J. Michell Clarke, of Bristol,¹³¹_{Sept., '95} also finds it unsatisfactory.

For several years Julius Friedenwald, of Baltimore,⁹_{June 22,'95} has made a routine practice of examining the gastric contents obtained one hour after an Ewald test-breakfast, to determine the activity of the milk-curdling ferment and its zymogen. From such examinations he concludes that, under normal conditions, the former may be present in dilutions up to $\frac{1}{40}$, the zymogen up to $\frac{1}{150}$. In cases in which there is a normal or diminished percentage of free hydrochloric acid, the milk-curdling ferment and its zymogen may be present in normal quantities or may be markedly diminished. Their estimation, therefore, in these cases, is of little value. The estimation of the milk-curdling ferment and its zymogen is, how-

ever, of great diagnostic as well as prognostic importance in those cases of gastric disorder accompanied by an entire absence of free hydrochloric acid. In these cases (chronic gastritis or carcinoma) there is marked diminution of the zymogen, depending upon the severity and extent of the disease. In cases of nervous dyspepsia, as well as in secondary catarrh, the zymogen is present in normal proportions in dilutions of from $\frac{1}{150}$ to $\frac{1}{60}$. It can, therefore, be readily determined whether there is actual disease of the gastric mucous membrane or simply a nervous or congestive condition. In those cases in which there is an absence of free hydrochloric acid and in which the labzymogen falls between $\frac{1}{60}$ and $\frac{1}{40}$, it is impossible to determine at once whether there is a catarrhal condition or whether nervous dyspepsia is present. Several examinations must be made to determine whether the labzymogen ranges above $\frac{1}{60}$ or below $\frac{1}{40}$. In cases of chronic gastritis the examination for labzymogen is of considerable prognostic importance. In those cases in which the labzymogen is diminished from $\frac{1}{15}$ to 0 there is no chance of recovery; in those in which it is diminished from $\frac{1}{40}$ to $\frac{1}{30}$ there is a possibility that judicious treatment may result in recovery. These conclusions are based on many hundred examinations.

A critical and experimental study of gastric chemistry has been made by L. Raulin, of Bordeaux ²⁵ Apr., '95; Bourget, ¹⁴ Oct. 31, '94; Hayem, ¹⁴ Oct. 31, '94 and Godart-Dankieux. ⁸⁶⁸ Aug. 10, '95. Practical notes on the examination of the gastric juice are given by A. Girard, of Paris ²⁴ Mar. 17, Apr. 7, '95; Kamenski, of St. Petersburg ⁵⁸⁶ No. 12, '95; F. Klug, ²⁴⁶ B. 50, p. 43 and Unger. ¹¹⁶ Oct., '95. A method of expressing the degree of acidity or alkalinity is published by J. B. Nichols, of Washington, D. C. ⁵⁹ Oct. 5, '95.

[Gastric chemistry is supreme nowadays, and is considered as furnishing a scientific basis for treatment; but the practical results are inferior to those shown by symptomatic treatment.—A. R.]

Diagnosis.—In discussing the question as to what can be done without the use of the stomach-tube in the diagnosis and treatment of gastric disease, A. L. Benedict, of Buffalo, ⁸⁰ Sept. 15, ⁶⁷³ Dec., '94 pronounces the tube as practically useless for determining the motion as well as the sensation and absorption of the stomach, except that the chemical examination of the stomach-contents assists in determining the motor and absorptive power. It is in investigating the secretions and the course of digestion that the tube becomes important, being the least distasteful and most practical of any method suggested. Still, in weak patients with irritable stomachs, who vomit frequently, the stomach-contents accidentally furnished may be made use of and the tube avoided. The question as to whether the fats and carbohydrates are innocuous or

whether they are fermenting is answered unfavorably by finding bacteria and yeasts microscopically and butyric and acetic acids chemically in the stomach-contents. But, knowing that fatty and starchy substances have been taken, that certain foods of these classes habitually cause trouble, finding the stomach tympanitic with gas, and noting the eructation of sour gas or liquid, in which we may smell butyric and acetic acids, the diagnosis of fermentation is quite as well established.

The change of cooked starch into sugar is not in itself an important one. If the pancreas can provide for any reasonable quantity of raw starch, it will probably not be overtaxed if the salivary function also devolve upon it. If the saliva is suspected of being at fault (which is rarely the case), let the patient chew a bit of raw potato and spit into a test-tube, in which, after a few minutes, the ordinary sugar-test will show whether or not enough ptyalin is secreted.

It has been shown that the presence or absence of pepsin and rennet has not much practical importance, a little of either seeming to act as well as a good deal. The author protests against the indiscriminate use of pepsin, and believes that, as Ewald says, it should be restricted to cases of advanced mucous catarrh and atrophy. The most important fact to be determined is the quantity of hydrochloric acid. Gastritis of all grades, carcinoma, and usually dilatation are marked by a downward tendency in the secretion of this acid; ulcers, by a marked increase. So far as gastritis is concerned, the stomach-tube is clearly contra-indicated.

Subacute gastritis can scarcely ever require the tube, either for diagnosis or treatment, unless it is excited by foul, fermenting, soft masses. Chronic gastritis can usually be diagnosed from the state of the circulation and the history of the case; still, the tube is desirable in order to verify the diagnosis, and is invaluable for treatment. Dilatation of the stomach can be diagnosed without the aid of the tube, although the alternation of tympany and flatness and the metallic tinkle of bubbles bursting in the half-filled stomach are valuable tests, possibly only when the tube is used.

In cancer the continued absence of hydrochloric acid, as determined from the analysis of the gastric contents, is diagnostic, but not pathognomonic, as was at first claimed. Few cases of cancer fail to present other indications of their nature, and, without confirmatory evidence, the non-acidity would scarcely warrant a positive diagnosis. There are cases, however, in which every hint as to the true condition must be eagerly sought.

As regards subacidity or, occasionally, non-acidity, loosely termed atonic dyspepsia, it must be borne in mind that, although

80 or 90 per cent. of the cases will be relieved by the administration of hydrochloric acid, there is danger, in the 10 or 20 per cent. of cases remaining, of giving inappropriate treatment unless the stomach-contents be examined. Acid neurosis, or supersecretion of hydrochloric acid, may be suspected from the occurrence of dyspepsia in a neurotic individual, from the account of sharp gastric pain temporarily relieved by taking food, from highly-acid eructations, and from the general characteristics of a state of over-excitement rather than depression of an organ. Still, the diagnosis needs the confirmation of chemical examination. The same neurosis culminates in peptic ulcer. The occurrence of a large hæmorrhage scarcely needs the assistance of the tube to establish diagnosis, and the treatment both of the neurosis and of the organic lesion consists of physiological rest of the stomach and remedies to calm the overwrought secretory nerves. Ewald refrains from introducing the tube in all cases of ulcer in which the diagnosis can be made in another way, the more so since in these cases the examination of the stomach-contents does not establish the diagnosis nor aid in the treatment.

Salinger, of Philadelphia,⁸⁰
Sept. 15, '94 states that before using the stomach-tube the patient's throat should be carefully inspected. Stenosis of the pharynx from large hypertrophied tonsils, tumors, and cicatrices may be absolute mechanical hindrances to its introduction. This author regards the therapeutic uses of the tube as many. G. S. Dickinson, of Erie, Pa.,⁵⁹
Sept. 15, '94 speaks favorably of the use of Einhorn's stomach-bucket in testing the gastric juice.

[As is well known, the causes of dyspepsia are multiple, the functional relations between the different organs, diathetic disorders, etc., appearing as diverse etiological factors. Hence differential diagnosis, as regards the causative conditions present in a given case, should be our main guide.—A. R.]

Dujardin-Beaumetz⁶⁷
Oct. 15, '94; ⁶⁷³
Dec. calls attention to a number of simple, but little-known, measures which will aid us in making a diagnosis in diseases of the stomach. To estimate exactly the condition of the digestive functions he knows of no better test than the morning meal, provided, of course, that this be always the same and taken at the same hour, according to habit. It should be composed either of coffee with milk in it, or of tea with milk and very little sugar, one or two small rolls, or one or two small pieces of toast without butter. The amount of liquid should always be the same, and should not exceed 500 grammes (1 pint). When the functions of the stomach are performed normally and physiologically, this breakfast, a veritable test-meal, will pass unnoticed. When the contrary is the case, a series of symptoms

will present themselves, enabling us to decide what special functions of digestion are disturbed. If, two hours after the ingestion of the meal, there is a sensation of heat in the stomach, with increased acidity, the case is one of dyspepsia from excess of hydrochloric acid. If, on the other hand, there is an abundance of gas, a feeling of heaviness and fullness and distinct slowness of digestion, the trouble is dyspepsia from deficiency of hydrochloric acid. When pain is experienced about a quarter of an hour after the meal, increasing as time passes, there is probably irritation and inflammation of the duodenum and gastroduodenitis. Painful cramps and even vomiting characterize disturbance of the muscular and nervous systems of the stomach.

Another simple measure is to learn from the patient at what time the symptoms appear. In excessive hydrochloric-acid secretion the sensation of heat and burning in the stomach always appears three or four hours after the meal, reaching the maximum intensity during the night, the patient being awakened between 11 and 1 o'clock by a burning in the stomach and œsophagus, more pronounced if the patient rise. The ingestion of food often relieves him, the excess of acidity being then, to a certain extent, reduced by the utilization of a portion of it in the peptonization of the food taken. It is in the painful forms of dyspepsia, and especially in the gastralgia of chlorosis, that attacks of pain are observed immediately after the repast.

Another point which is of value is the occupation of the patient. Excessive hydrochloric-acid dyspepsia is, indeed, a professional disease,—as, for instance, those whose business brings them in contact with alcohol, as wholesale and especially retail liquor merchants; grocers selling wines and liquors; restaurant-keepers; men who put the wine in barrels or carry it into the cellars; commercial travelers, and especially those in the liquor trade; tavern-keepers, etc. It is also common in those who expend a great deal of physical force in their work, or who do night-work, as butchers, bakers, marketmen, etc.

The objective signs of gastric affections are considered at length by Lion, of Paris, ³⁶⁰ Aug., Sept., '95 who takes his text from the clinical lessons of Hayem. Great importance is attached to the influence of deformities of the chest as produced by corsets. Three varieties of these constrictions producing gastric symptoms are described: (1) the submammary, causing ptosis (enteroptosis of Glénard) and displacement of organs; (2) the hepatic, producing constriction of organs without necessary ptosis,—here the pylorus may be compressed between the liver and the vertebral column, giving rise to mechanical obstruction; and (3) the subhepatic,

leading to upward displacement and respiratory difficulties. As regards the shape of the abdomen, prominence in the upper part is seen in large eaters, such as diabetics. Prominence below may occur in many conditions, as in women who have borne many children, gastropotosis, etc. A central prominence, extending from the lower part of the sternum to below the umbilicus, is seen after a full meal in patients with pronounced dilatation without ptosis of the stomach. Flattening of the abdomen with hypogastric prominence occurs in dilated stomach with ptosis. A slight transverse ridge may often be seen corresponding to the lesser curvature of the stomach. The abdomen, observed in profile, may show (1) a substernal hollow, which occurs in inanition, frequent vomiting, etc.; (2) an abnormal prominence, mostly substernal or epigastric, due to distension of the stomach; (3) a flattening of the epigastric region with hypogastric prominence, seen in gastric dilatation with ptosis.

J. Schneyer³⁴_{Oct. 9, '94} has made observations on the number of leucocytes in the blood during digestion in 18 cases of cancer of the stomach, 3 of early pyloric stenosis, and 8 cases of round ulcer. He found that the leucocytosis of digestion was absent in all the cases of cancer, whilst in non-malignant stenosis and in 7 cases of round ulcer the leucocytosis of digestion occurred promptly. In only 1 case of ulcer was it absent. The occurrence of leucocytosis during digestion the author regards as a point of some importance in the diagnosis of diseases of the stomach, and looks upon it as an indication that the case is not one of cancer.

The splashing sound of the stomach and its significance in gastric diseases are discussed by A. Rose, of New York,¹_{June 15, '95} who finds it an important factor in determining the lower border and dimensions of the stomach. If found while the stomach is free of food it is, except in instances of continuous supersecretion, a means of diagnosing gastric muscular asthenia.

Federn⁶⁷³_{Sept., '95} describes an hitherto unnoticed phenomenon of percussion of the stomach. If the normal stomach of an individual in the dorsal decubitus be percussed, a tympanitic sound will be produced. After several deep inspirations this sound becomes clearer and more distinctly tympanitic. The modification in the sound can only be explained by an increased quantity of air in the stomach following the inspirations. It has for some time been admitted that air was found in the stomach, but it has been supposed to be introduced during deglutition. If it be true that it is introduced during respiration, the fact cannot be without influence on the digestive functions, and should be more closely studied.

Martius, of Rostock, ⁸⁴_{No.7,'96} describes some experiments made in Meltzing's clinic on the living stomach by the diaphanoscopical method. A sound bearing an Edison lamp was introduced into the stomach of persons on whom the boundaries of lungs and liver had been previously determined by percussion. Experiments were made with the patient lying and standing, with the stomach both full and empty, the results being as follow: The healthy stomach when empty always reaches as low as the umbilicus; when full it descends still lower. The lowest normal limit is indicated by a line joining the two summits of the iliac crests. In the erect position the limit descends three or four centimetres farther. The enlargement when the stomach is filled is marked chiefly toward the right, and very great size of the stomach may be observed without any subjective disturbances. Martius holds that morbid symptoms are entirely due to insufficient motive power of the organ, and that a low position of the inferior border is not sufficient to permit of the diagnosis of morbid changes in the stomach; furthermore, that cancer of the stomach in the early stages cannot be diagnosed by diaphanoscopy, but that the exact seat of a growth of some size may be determined by this means.

Einhorn's gastrodiaPHONE has received considerable attention during the year, and articles on the transillumination of the stomach have been published by Einhorn himself ¹¹⁴_{B.27,H.3,4; Sept.15,'94}; A. Meltzing, of Rostock, ¹¹⁴_{B.27,p.411} and L. Kuttner, of Berlin. ⁴_{Sept.16,'95}

F. B. Turck, of Chicago, ⁸⁴_{Nov.1,2,'95} describes a gyromele, or revolving sound, for use in exploring the stomach, in removing adherent material from its walls, and in locating strictures from the œsophagus to the cardia. It consists of a flexible cable to the end of which is attached a sponge covering a spiral spring, which can be removed and changed. The cable passes through a rubber tube, and this, again, is attached to a revolving apparatus for the purpose of producing revolutions of the sponge within the stomach.

Wesener ²⁰²¹_{'95} has made a series of experiments with it, finding, in several cases of anacidity, that revolutions of the gyromele for five minutes caused 0.1 per cent. of hydrochloric acid to be secreted.

Gastritis.

Hayem, of Paris, ³_{Oct.27,'94}; ²_{Dec.29,'95} believes that acute parenchymatous gastritis is a process beginning in the glandular elements, and in the pure form is independent of any leucocytic infiltration. The portion of the stomach first affected seems to be the cardiac, and thence the lesion spreads, with the result that the pyloric portion becomes completely changed, losing its distinctive character, and

finally being indistinguishable from the cardiac end. He maintains that there are no special cells for the secretion of hydrochloric acid, and in support of this he points out that in the stomach of the newborn child the parietal cells are well developed, although gastric digestion is carried on without any hydrochloric acid being present. Again, he has found no increase of parietal cells in the adult stomach in cases of hypersecretion of this acid, but the increase in amount of hydrochloric acid has certainly seemed to correspond with the transformation of pyloric into peptic glands, or, in other words, with the disappearance of the alkaline pyloric secretion.

A series of cases showing a great similarity to glandular gastritis, but due to the use of alcohol and tobacco, is reported by Boas, of Berlin.⁴_{No. 41, '94} A careful examination of the stomach-contents showed profuse secretion of mucus and increase in the acid reaction. By the naked eye were seen reticular fragments which, under the microscope, proved to be pieces of gland.

A case of croupous gastritis is described by John Thomson, of Edinburgh,⁵¹_{Apr., '95} in a child with symptoms of acute pulmonary tuberculosis. According to the author, croupous gastritis is almost always a secondary condition; and, when not due to diphtheritic membrane spreading into the stomach, it is found in feeble individuals whose vitality has been very seriously lowered by exhausting disease. In several of the cases previously reported tubercle in some form was the primary ailment. It seems as if the primary disease acts by reducing the child's resisting powers to such an extent that the direct cause—which may be either pathogenic organisms or the products of fermentation of the stomach-contents—is able to produce this peculiar effect.

Schmidt,⁶⁰_{May 9, '95} regards primary atrophy of the gastric mucous membrane as the terminal stage of acute or more especially chronic gastritis. The symptoms are general anæmia simulating pernicious anæmia, failure of the secretory and sometimes of the motor functions of the stomach, and attacks of severe pain with vomiting. Two kinds of atrophy of the mucous membrane have been described,—the parenchymatous and interstitial. Mostly these processes go hand in hand. Primary atrophy of the gland-cells is easily understood when the injuries to which they are exposed are taken into account. The author has examined the gastric mucous membrane in many cases, special precautions having been taken to preserve it intact, and finds the surface epithelium the most resistant element in the gastric parenchyma. Cases of persistent absence of the gastric secretory function are recorded by D. D. Stewart, of Philadelphia,⁵⁹_{Aug. 10, '95}; here the trouble was not merely

functional, since, in two of the cases, motility was restored, the patients completely recovering, but the gastric juice failing to return. He regards Stockton's suggestion, as to whether long-continued inhibition of the glands may not be succeeded by atrophy, as worthy of consideration. A further study of the condition, to which he gives the name of *achylia gastrica*, is made by Einhorn, of New York. ⁵⁹ July 6, '95

Gastritis is the subject of more or less exhaustive papers by A. P. Buchman, of Fort Wayne ¹¹⁵⁰ July, '95; A. W. Stinchfield, of Rochester, Minn. ¹⁰⁵ Sept. 1, '95; S. Baruch, of New York, ⁵⁹ Oct. 5, '95 who is inclined to make a hopeful prognosis in most cases.

Dilatation.

In describing a fatal case of acute dilatation of the stomach, Mahomed, of London, ² Jan. 19, '95 expressed the opinion that excessive secretion was a factor in the disease besides the loss of muscular power in the stomach-walls. He had found that in all the recorded cases the history showed the existence of some primary disease in the vagus tract, and the experiments of Carion and Hallion, of Paris, ³ Aug. 21, '95 show that section of the vagus nerves is sufficient to produce complete atony and permanent dilatation of the stomach in the dog.

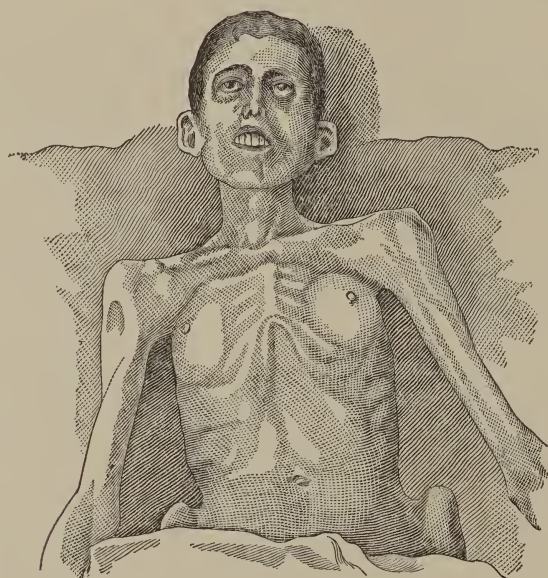
Hayem ³¹ July 13, '95; ² Sept. 7 describes a case of acute dilatation of the stomach accompanied by physical signs simulating heart disease. Ch. Mongour, of Bordeaux, ²⁵ Nov., '94 observed a case of dilatation of the stomach in which death occurred with all the symptoms of uræmic coma.

Dilatation of the stomach is considered by B. Ullmann ³⁴ No. 19, '95 in a careful article, and also forms the subject of a clinical lecture by Mathieu, ¹⁰⁰ Mar. 7, 14, '95 who advocates the following treatment when surgical intervention is not practicable: Diminish the labor of the organ by regulating the diet, washing out the stomach, and exciting the motor functions through suitable remedies; diminish gastro-intestinal fermentation by choice of food and lavage with antiseptic solutions; combat hyperacidity, pain, and constipation when present. If there be inanition, rectal alimentation should be employed.

Good results are recorded by Cureton ⁶ Aug. 24, '95 in a series of twelve cases treated by siphonage combined with drugs, according to the individual indications. It seemed to this author that the very fact of introducing a tube into the stomach stimulated the muscular walls to contract and diminish the size of the organ, and thus had a more or less curative influence upon the muscular coats in cases of simple atonic dilatation.

Nervous Anorexia.

Etiology and Pathology.—P. Sollier, of Paris, ⁹²Jan., '96 in a paper on the influence of the sensitiveness of the stomach on the phenomena of digestion, claims that the organ is more sensitive than is generally supposed, and that its sensitiveness has a large influence on normal digestion. The stomach has motor and secretory functions, the latter depending on two factors,—the condition of the glandular element and the nervous system; it is, therefore, evident that variations in the nervous system may affect the amount of secretion. The sensitiveness of the stomach is shown in three ways: (1) by



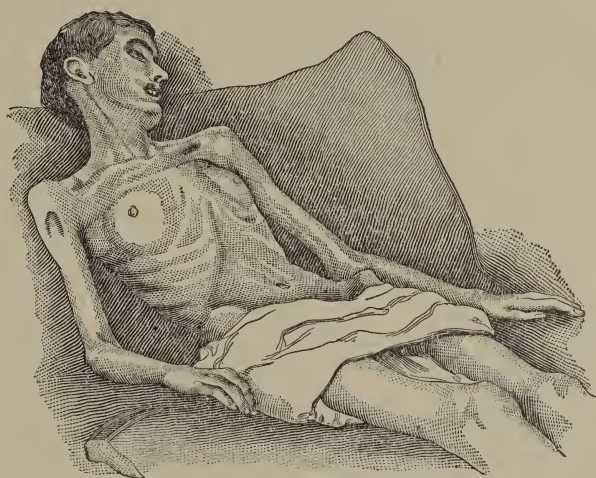
ANOREXIA NERVOSA. (STEPHENS.)

Lancet.

sensation of hunger, (2) by contact of food, and (3) by knowledge of satiety. To support these theories, clinical, experimental, and chemical methods are resorted to by the author, the clinical examples chiefly dealing with the anorexia of hysteria. In these cases he has often found an area of cutaneous anæsthesia over the region of the stomach, which he thinks varies in intensity with the degree of altered sensation in the stomach itself; further, it is present only so long as the feeling of hunger is absent, and disappears when desire for food returns. It cannot be satisfactorily made out in the graver forms of hysteria, where cutaneous anæsthesia is extensive. If the mechanical functions are also involved there may be gastric atony. The same condition of the stomach is

noted in melancholia and hypochondriasis. When the treatment is directed to the nervous system these cases improve rapidly without any special regulation of diet. The same author ¹⁸⁸⁸ _{Sept. 16, '95} describes a form which he calls mental anorexia, observed in girls or young women, and the prognosis of which is graver than is that of hysterical anorexia or nervous dyspepsia, owing to the mental heredity concerned in its evolution.

The readers of the ANNUAL will, no doubt, be interested in the details of the post-mortem examination of a case similar to one to which their attention was called in the issue of 1889 (vol. i, C-15). This case, under the care of the late Sir William Gull, ⁶ _{Mar. 31, '88} attracted considerable notice at the time. The disease



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does not usually prove fatal; hence the present case, which was in charge of Lockhart Stephens at the Emsworth Cottage Hospital, ⁶ _{Jan. 5, '95} is of considerable importance. The patient, a tall, intelligent girl of 16 years, of fair complexion, with a sad expression strongly resembling the diabetic face, was admitted to the hospital March 10, 1888, on account of extreme emaciation. She weighed only 56 pounds, and Stephens's first impression before examining the urine was that he had to deal with a case of diabetes, though he was doubtful of this, never having seen in diabetes, nor in any other disease associated with wasting, so much physical strength in such an ill-nourished body. Finding no symptom but wasting, he came to the conclusion that the case was one of "voluntary starvation" in an otherwise healthy subject. Up to ten months

previous to admission the patient had been a remarkably well-made, plump, and healthy-looking girl, full of spirits and eager to attract the notice of her friends, which she did to a considerable degree, becoming a favorite with her teachers and others. Gradually, and from no apparent cause, she showed a disinclination to take the same food and at the ordinary meal-times as the rest of the family. This went on until she reached the stage of emaciation depicted in the accompanying illustrations. She avoided taking nourishment as much as possible, resorting to every trick in order not to swallow it. Death took place a month after her entrance to hospital, and the necropsy was made fifty-six hours later.

The body weighed 49 pounds (22.3 kilogrammes); the height was 5 feet 4 inches; the circumference of the arm high up at the shoulder was $4\frac{3}{4}$ inches; circumference of the wrist, $4\frac{1}{4}$ inches; circumference of the waist, 17 inches; circumference of thigh just below the great trochanter, 8 inches; circumference of the neck, $8\frac{1}{2}$ inches. The body was extremely emaciated; there was not a trace of fat in the subcutaneous tissue with the exception of the breasts, which stood out boldly. On opening the abdomen there were visible: the lower edge and anterior surface of the right lobe of the liver, measuring three and one-half inches vertically; the anterior surface of the stomach for two-thirds of its extent, starting from the pyloric end, which was below the level of the umbilicus, so that the long axis of the organ was directed almost vertically downward; three inches of transverse colon just above the pubes, in the great omentum. The bones of the head were thin, the membranes and vessels were normal, and the brain was normal throughout; it weighed $45\frac{1}{2}$ ounces (1420 grammes). The right lung weighed 19 ounces (600 grammes); it was much congested from hypostasis. The left lung weighed $11\frac{1}{2}$ ounces (358 grammes); it was less congested than the right. Both lungs were otherwise normal. The left pleural sac contained about $\frac{1}{2}$ ounce (16 grammes) of clear serum. The heart weighed 4 ounces (125 grammes); its external appearance was normal. Both auricles contained small decolorized clot. The left ventricle was firmly contracted; the right was thin and flaccid; the valves were healthy. The liver weighed $23\frac{1}{2}$ ounces (730 grammes); it was normal in appearance. The gall-bladder contained 1 drachm (4 grammes) of clear, thin bile. The pancreas (weight $1\frac{1}{2}$ ounces—50 grammes), spleen (weight $1\frac{1}{4}$ ounces—40 grammes), adrenals (weight of each $\frac{1}{4}$ ounce—8 grammes), and kidneys (weight of right 3 ounces—90 grammes, of left $2\frac{1}{2}$ ounces—80 grammes) were all normal. The uterus and the ovaries together weighed $\frac{7}{8}$ ounce (27 grammes).

Debove, in a clinical lecture at the Hôpital Andral, ⁷³_{Oct.19,'95} states that though he had seen two such cases of death, the disease is rarely directly fatal, death coming on through some other disease. He has seen tuberculosis supervene in such cases, and adds that nothing prepares the soil better for plithisis than does anorexia,—a statement made years ago by Laségue, ³⁶⁰₇₃ who believed that death was never due to the anorexia alone. Old tuberculous foci were found at the base of the left lung in a fatal case recorded by C. F. Marshall, of London, ⁶_{Jan.19,'95} who remarks, however, that the tubercle was too small in extent and too localized to have been a factor in the cause of death, which was presumably due to the inanition having proceeded too far for recovery before systematic and regular treatment was begun.

Treatment.—Debove ⁷³_{Oct.19,'95} insists on the necessity of compelling the patient to eat, by no matter what method. The appetite will return on eating. That a certain amount of compulsion is necessary is attested by a case of Drummond's, ⁶_{Oct.19,'95} that of a neurotic young man of 25 years, weighing 70 pounds (27.3 kilogrammes), who had been lying in bed for five years, and who gained 14 pounds (6.4 kilogrammes) after a month's treatment. Baruch ⁵⁹_{Oct.5,'95} advises hydrotherapy and lavage of the stomach.

Nervous Dyspepsia.

H. Illoway ⁵⁹_{Jan.5,'95} defines nervous dyspepsia as an ailment of the stomach, without anatomico-pathological characteristics, dependent solely upon the nerves of the stomach. The stomach is primarily affected, and if any symptom on the part of the general nervous system appear it is due to an irritation proceeding from the stomach, and therefore a secondary manifestation. The most unpleasant symptom is a condition of general irritability. Nervous dyspepsia is to be differentiated from gastric neurasthenia, in which more or less of the characteristic features of neurasthenia are always present. Functional gastric disturbance, according to C. G. Stockton, ⁹_{Dec.15,'94} is rarely a primary trouble, the stomach reflecting almost every influence to which the organism is subjected. Irritation of the brain, the spinal cord, the testicle, the kidney, or the liver results in anorexia, or, perhaps, vomiting. Grief, joy, worry, and pain lead to similar results. When there is toxæmia from constipation, or renal or cutaneous insufficiency, it is the stomach that raises the alarm. Alcohol, tobacco, coffee, and other substances may induce digestive disturbance indirectly through the blood and nervous system. Malaria, gout, and tuberculosis often offend in the same manner. Finally, Stockton lays stress upon the later phases of syphilis as a cause that has apparently passed un-

noticed. The connection between affections of the stomach and diseases of other organs is also considered by S. Gross, of New York ¹_{May 4, '95}; M. Stamm, of Fremont, O. ²³³_{Jan. 22, '96}; Ferramini ⁵⁸⁹_{No. 113, '96}; du Pasquier, ³⁶³_{Apr. 13, '95} and A. A. Jones, of Buffalo. ⁹_{Sept. 29, '94} Byron Robinson, of Chicago, ¹¹⁵⁰_{Oct., '94} believes that the stomach diseases of women in general are reflexes from pelvic irritation and that treatment of the genital disease will cause a gradual decrease of the visceral disturbance.

Glynn, of Liverpool, ¹⁸⁷_{July, '95} in considering the painful digestion of hysteria and its diagnosis from gastric ulcer, points out that pain, especially after food, perhaps relieved by vomiting and occasionally hæmatemesis, is met with in merely functional disorder as well as in ulcer of the stomach. The various pains and hyperæsthesiæ from which the chlorotic suffer are due to hysteria, the most convenient indication of which is tremor of the eyelids. The few chlorotic girls who betray no symptoms of hysteria do not, as a rule, suffer from neuralgias and painful digestion. He considers it likely that the pain which often attends gastric ulcer is due to the fact that this lesion often co-exists with hysteria and hysterical neuralgias, more especially when the patient is exhausted and anxious. A. C. E. Harris ²_{May 11, '95} agrees that it is only in chlorosis that painful digestion is met with, but only in about a third of the cases and among those who do hard manual labor.

Ulcer of the Stomach.

Etiology and Pathology.—A case bearing on the etiology of ulcer is detailed by du Mesnil de Rochemont. ³⁴_{Dec. 11, '94}; ²_{Jan. 26, '95} A woman, aged 38, entered hospital with gastric carcinoma. An examination of the stomach-contents showed the presence of large quantities of lactic, but only traces of hydrochloric acid. As the patient steadily lost ground gastro-enterostomy was performed, but she died with signs of perforative peritonitis on the following day. Post-mortem examination showed, on the lesser curvature and posterior wall of the stomach, a large carcinoma, in the middle of which was a perforation with peritonitis about it. Near the pylorus was a funnel-shaped ulcer about the size of a three-mark piece. It was absolutely independent of the carcinoma, as was proved microscopically and otherwise. There was sufficient evidence, in the author's opinion, to show that the ulcer appeared later than the carcinoma. Thus, hyperacidity and increased digestive powers are not essential to the formation of a gastric ulcer; some other cause must be looked for in this case. A tolerably large and thrombosed vessel was here found near the top of the ulcer. This had produced necrobiosis. It could not be ascertained whether this thrombosis

had any relation to the carcinoma,—that is, whether embolism had occurred from a thrombosed vessel in the region of the carcinoma. There was considerable atheroma of the aorta, and the heart-muscle showed fatty degeneration. J. W. Greig, of Toronto, ³⁹_{Feb., '96} expressed the belief that the exciting cause in this disease is essentially peptic in character, some predisposing condition of the gastric mucous membrane being necessary to allow of the digestion of the affected area. Trauma *per se* would seem insufficient to cause a chronic ulcer; but, occurring in a poorly-nourished, anæmic person, ulcer might result. Embolus, except in very rare cases, may be practically excluded, as no convincing case of ulceration following embolus is on record; and the ulcers produced experimentally by emboli are multiple and occur in the fundus, differing entirely from the solitary pyloric ulcers of the human being. Thrombosis and various degenerative changes in the blood-vessels would seem to be the most likely predisposing causes, several cases having been reported in which the ulceration was associated with atheromatous and fatty changes in the arteries, or with endarteritis obliterans. Hyperacidity is a frequent, but not invariable, accompaniment of ulcer. Its presence, he thinks, is just as likely to be the result as the cause of the disease, though it would undoubtedly retard healing. In a case of his own the cause was local malnutrition, the result of arterial degeneration, which could be readily detected in at least some of the patient's vessels. Luxenburg and Zawadski ¹¹³_{No. 50, '94} found that syphilis could be considered the cause in a case carefully studied by them, both during life and by autopsy.

Rendu ²¹²_{July 10, '96} insists upon the neuropathic tendency so often noted before the appearance of gastric ulcer, particularly in women, in whom the disease occurs much more frequently than in men. Stoll, of Zurich, ²²⁶_{B. 53, II. 5, 6} does not attribute this to the influence of sex, however, but believes that the preponderance of ulcer in old women is partly due to the fact that, after middle life, there are more women living and, paradoxically, more dying than men, while in the fifth decade, when the two sexes lead similar lives, the relative frequency of ulcer is practically equal. According to Stoll, three-fourths of the cases occur between the ages of 25 and 60 years.

Gilbert Barling ²_{June 15, '96} remarks that the incidence of perforation of gastric ulcers does not in the least degree correspond to their incidence of locality. A large majority of the ulcers occupy the posterior surface and lesser curvature, a few the region of the pylorus, and a still fewer number involve the anterior surface of the stomach; whereas, ulcers on the anterior surface perforate with great frequency, those on the posterior surface rarely in pro-

portion to their actual number, while those on the lesser curvature perforate comparatively often. The explanation of this varying tendency is found, first, in the fact that ulcers on the posterior surface and, to a lesser extent, those on the lesser curvature, as they advance tend to become adherent to the adjacent parts, while those on the anterior surface, because of greater mobility, rarely form adhesions; and, secondly, because the symptoms of ulcers on the anterior wall of the stomach being less marked than those of ulcers situated elsewhere, the subjects of these are less often aware of their presence, and are more apt to be careless regarding the quality and quantity of diet, whereby the ulcer is subject to undue stretching and traumatism, which may result in perforation.

Diagnosis.—In considering the diagnosis, Gilbert Barling² June 15, '96 states that the previous history usually points to the stomach as the seat of lesion. Perforation generally takes place when the stomach is full or partly so, when the patient is in a more or less vertical position, and frequently after some particular act or exertion,—stooping, sneezing, or lifting of some heavy weight. The moment of perforation is usually marked by sudden acute abdominal pain, producing at times faintness, or even collapse or death. Occasionally there may be slight vomiting. The abdominal walls retract and the muscles become rigid; respiration is usually thoracic, quick, and shallow; the temperature subnormal; the pulse quick and feeble. The symptoms now ensuing depend upon the position of the ulcer, the degree of distension of the stomach, and the position that the patient occupies. The extravasating material may spread widely into the peritoneal cavity, causing quite intense and rapidly-spreading peritonitis and death usually in from twelve to seventy-two hours; or it may remain for a time localized between the stomach and liver, eventually escaping from there into the general peritoneal cavity, causing at first shock, which passes off; and when septic peritonitis ensues from further leakage death occurs, usually in four or five days from the time of the seizure; or, finally, the extravasating material may remain localized under the diaphragm and produce a subphrenic abscess. In such a case, after the shock passes away, there ensues a period during which the symptoms are so slight as to almost make one doubt the accuracy of the diagnosis. Then follow the general symptoms of pus-formation and the local signs indicating a gas-containing cavity below the diaphragm. Following these may come symptoms of septic invasion of the thorax,—pleurisy, empyema, pneumonia, or lung-abscesses.

Chaput⁷ Dec., '04 describes a case of ulcer mistaken for cancer and treated by sodium chlorate, with such improvement that the case

was published as an example of gastric cancer cured by sodium chlorate. Several months afterward the patient entered hospital again, when ulcer was diagnosed, and gastro-enterostomy became necessary, the patient dying a few days later. * The diagnosis of cancer had been based on the presence of a swelling in the epigastrium, ascites, œdema, a straw-colored complexion, and disturbed digestion. Stoll ²²⁶_{B.53,H.5,6} states that many ulcers are found post-mortem that have occasioned no symptoms during life, and that the only reliable signs, apart from hæmorrhage, are pain and tenderness. Death seldom occurs from the ulcer itself, but from exhaustion or complicating affections. W. H. Pearse ²⁶_{June 1, '95} dwells on the difficulty of distinguishing between the neurotic indigestion of young women and gastric ulcer, the symptoms being so similar.

Osler, of Baltimore, ²⁸²_{Aug., '95} observed a case in which a visible contractile tumor of the pylorus followed an ulcer of the stomach in a man of 28 years, with a previous history of dyspepsia, gastralgic attacks, the vomiting of large quantities of blood, and persistent hyperacidity of the gastric juice,—symptoms which pointed unmistakably to gastric ulcer. This tumor would lift the skin in the middle line, between the navel and the ensiform cartilage, appearing as a definite tumor transversely placed and was then to the touch firm and hard. After lasting for from half a minute to a minute it would gradually disappear with sometimes an audible sizzling sound. On palpation the mass became very much softer, but even when relaxed it was evident as a somewhat sausage-shaped, tubular body, which could be rolled beneath the fingers. Visible peristalsis, absent at first, later became evident. The only rational explanation seemed to be that, in consequence of the ulcer, there was much cicatricial puckering with narrowing of the pyloric orifice, and consequent hypertrophy of the pyloric zone. The phantom character of the tumor could be alone explained on the supposition of an alternate contraction and relaxation of the hypertrophied muscular tissues about the pylorus; and with this the evidence obtained on palpation was fully in accord, since, when the tumor was visible beneath the skin, it was excessively firm and hard. Relaxation took place under the hand with a marked change in the consistency. The autopsy revealed a much contracted, thickened pylorus, the wall in one place being fourteen millimetres thick. At a place about three millimetres from the duodenal orifice there was an area fifteen by ten millimetres which looked like the floor of a healing ulcer. The entire muscular coat of the stomach was greatly hypertrophied. Microscopical examination revealed nowhere any carcinoma, the entire tissue being enormously hypertrophied muscularis.

According to Pick¹¹⁴_{B.26, II.5,6; May, '96} perforation of a gastric ulcer into the thoracic cavity is twice as frequent as adhesion to and perforation of the anterior abdominal wall. The commonest outlet is in the pleura or lung, and affected the left pleura nine times, the left pleura and lung seven times, and the right pleura once. In the latter case the perforation was consecutive to subphrenic abscess. The pericardium was affected alone in six cases and the pericardium and heart in four. In one case the mediastinum was affected and in the author's case the anterior thoracic wall with the formation of a tumor in that part. In twenty cases the perforation was direct and in eight indirect or following subphrenic suppuration. In this conclusion the author differs from Brinton, who studied a smaller number of cases. Pick's analysis of twenty-eight cases shows that the rare ulcers of the fundus are much more likely to rupture into the thorax than those of all the other parts of the stomach, but that the occurrence of thoracic complication depends largely on the existence of old adhesions and alterations in the position of the thoracic organs. The exciting cause of the perforation in most cases is mechanical, either by distension from food or gas, vomiting, straining at stool, etc. Death is usually due to complications, rarely to shock. Perforation of the heart does not cause instant death, patients having lived as long as three or four days after hæmorrhage began.

C. O. Hawthorne, of Glasgow,²¹³_{July, '96} comments on the rarity of parotitis as a sequela of gastric ulcer, and records two cases of this nature.

Treatment.—Guthrie Rankin, of Warwick, Eng.,⁶_{Feb. 9, '96} gives the details of a series of ten cases of gastric ulcer in which the combined use of papain, iron, and cannabis Indica was followed by satisfactory results. It would seem doubtful, according to the author, whether many cases of so-called irritative dyspepsia may not in reality be due to a definite lesion of the mucous membrane in a latent condition. Hæmatemesis is not necessarily present in every case of even acknowledged gastric ulcer, and in its absence it must always be a matter of difficulty to decide whether the train of symptoms owes its cause to a simple catarrh or to organic change in the substance of the stomach-wall. The occurrence of hæmorrhage settles the diagnosis; but where remedies, useful in cases about which by reason of the hæmatemesis there can be no doubt, give equally good results in allied cases which fall short of the confirmatory evidence afforded by the bleeding, it may be assumed that such cases may owe their symptoms either to an early stage of the same condition or to an accomplished lesion of the surface so chronic and indurated as to prevent actual loss of blood.

By some observers the persistence of pain in patients who have admittedly suffered from gastric ulcer has been ascribed to imperfect movement of the stomach-walls consequent upon the interference of the resulting cicatrix; but the histories of four of his cases would rather indicate either imperfect healing or the occurrence of another patch of ulceration as the more probable explanation of the continuance of this symptom. Were this not so it is hardly conceivable that each of these cases could have recovered so thoroughly, because it seems certain that in several of them there must have remained one or more cicatrices of considerable dimensions. As the large proportion of such ulcerations occurs in anæmic patients, the *raison d'être* of the iron is manifest. It may be that in some cases iron is not indicated at all by the existence of any appreciable anæmia; but even then it is probable that the blood is impoverished to some degree, and that the hæm-atinic properties of the drug not only restore this depreciation of quality, but also, in a secondary way, promote the healing process at the site of lesion. The cannabis Indica is useful as a sedative to the stomach-walls, as a controller of its muscular action, and as a prop to its nerve-supply, while it is also fully recognized as a direct promoter of appetite. Lastly, papain, which is the most important member of the trio, probably has a complex effect on the curative process. It is well known that when a solution of papain is painted over a fissured or ulcerated tongue it rapidly provokes cicatrization. The drug is also of value as a speedy solvent of dead tissue, and to some extent it is credited with antiseptic and tonic properties. Its great use, however, medicinally, has hitherto been as a digestive ferment, and its activity in this respect would seem to exceed that of pepsin, pancreatin, or any other known agent. If all these powers of papain be admitted it is easy to conceive a reasonable hypothesis to explain the happy results afforded by it in cases of gastric ulcer, particularly when it is combined with other drugs such as those indicated, which by their collateral effect assist and intensify its action. This hypothesis is strengthened by the post-mortem evidences in one case and still further confirmed by the marked alleviation, if not permanent cure, in the others.

A. P. Voïnovitch, of St. Petersburg, ⁸⁵⁹_{No. 9, '95} procured complete cessation of all symptoms in fourteen days, in two grave cases of long standing, by the use of sulphate of atropine, 0.06 gramme (1 grain); distilled water, 8 grammes (2 fluidrachms); 2 drops three times a day.

The bismuth treatment has been given a systematic trial by Savelieff, ^{116 15}_{Oct., '94; Dec., '94} who used the method recommended by Fleiner,

giving his patients, fasting, about 10 grammes ($2\frac{1}{2}$ drachms) of bismuth, suspended in about 200 grammes ($6\frac{1}{2}$ fluidounces) of warm water, and were instructed to wash down any portion that may have remained in the upper passages. They then lay down in bed with the pelvis raised, and remained so for an hour. As in the greater majority of cases the seat of the ulcer is on the posterior wall of the stomach, or small curvature, or near the pylorus, it is probable that the remedy would fall on the affected spot, especially if the pelvis is slightly tilted up. Savelieff believes with Fleiner that the position of the patient is of great importance in the treatment. He does not, however, go so far as asserting that the localization of the ulcer may be made by altering the position of the patient and the presence of certain tender spots. It is useful to introduce the bismuth by means of the tube after washing out the stomach, but this procedure is not necessary unless there is decomposition of the gastric contents. Fleiner recommends that the tube should be retained for a little time after the patient assumes the horizontal position, so as to allow of the water being drawn off after the bismuth has settled. This is, however, according to Savelieff, quite unnecessary, and it causes much discomfort to the patient. About 200 grammes ($6\frac{1}{2}$ drachms) of bismuth were used by each patient altogether, and a definite effect was achieved. The diet was restricted to milk, stale bread, biscuit, butter, and thick soups of rice and sago. Once a day a larger quantity of raw minced meat or ham was permitted, with a soft egg occasionally. Bodily movement was restricted, and rest was enjoined after each meal. It was also ordered that food should be taken every two hours. Most of the patients carried on their ordinary duties; and after the bismuth was stopped they went on ordinary diet, avoiding, however, certain foods. The results of the bismuth treatment were regarded as excellent. In all the cases, with the exception of one of cancer of the stomach, there was complete disappearance of all troublesome symptoms during the treatment. The drug did not produce constipation, but, on the contrary, relieved it where it existed before. Relapses, unfortunately, are not prevented, and for recent cases prolonged rest with milk diet is advisable. Pariser,⁶⁹_{No. 23, '95} when this method fails, does not hesitate to forbid all food by the mouth for from six to twelve days, sustaining the patient by rectal alimentation and small doses of cocaine to diminish hunger. He allows them to sip a little ice-water when there is great thirst. Singer,¹⁶⁹_{Mar., '95} who also favors rectal alimentation in these cases, gives, as an auxiliary treatment, a mixture of chloroform and bismuth subnitrate to calm the gastric pain and a liquid opiated mixture to quiet hunger and thirst when

accompanied by excessive diarrhœa. Schlesinger, of Vienna,⁵⁷
employs Boas's plan and rectal alimentation, using injections of
200 grammes ($6\frac{1}{2}$ fluidrachms) of milk, a little starch, two eggs,
and a small quantity of salt. If the rectum is irritable, a few
drops of laudanum may be used.

Cancer of the Stomach.

Pathology and Diagnosis.—The fact that this disease is a surgical one and that all drug treatment has proved worthless makes the importance of early diagnosis self-evident. As Manges, of New York,⁵⁹
^{Apr. 27, '95} well says, a timely operation presupposes a timely diagnosis, and the prognosis of an early operation is improved not alone by the smaller size of the tumor and fewer adhesions, but, what is equally important, by the fact that the patient's strength has not been sapped by the disease. To wait for a tumor, as is usually recommended, is to wait too long; for it is seldom present before the third or sixth month of the disease, and usually only becomes distinctly palpable in the latter half of the disease, or toward the end of the patient's life. Bouveret²⁰²²
^{'94} claims that the presence of a palpable tumor indicates that the disease has passed beyond the limits of the stomach, while Czerny regards the presence of a distinctly palpable tumor as a contra-indication to a radical operation. Hence the need for improved methods of diagnosis,—a need attested by the many articles that have been published during the year in all parts of the professional world. Perhaps the greatest importance should be attached to the work of Boas, of Berlin, upon the presence of lactic acid in cancer. The tendency hitherto has apparently been toward the theory that lactic acid is a normal constituent of the gastric contents and that in certain pathological conditions it is likewise frequently found during the entire period of gastric digestion. Boas, who, in conjunction with Ewald,²⁰
^{B. 101, '85} published experiments on the subject that have become classic, in continuing his researches,¹¹⁴
^{B. 21, H. 3, 4, '95} finds that, under normal conditions, lactic acid is not produced during any stage of digestion. He made use, in his experiments, of a test-meal entirely devoid of lactic acid, and consisting of a soup containing one tablespoonful of oatmeal-flour (Knorr's *hafermehl*) to the litre (quart) of water. The ether-extract of such a soup does not produce, on oxidation, the slightest traces of aldehyde, and, therefore, does not contain any lactic acid. By this test lactic acid was not found in 5 cases of chronic gastritis, 5 cases of atony, and 6 cases of dilatation (non-malignant forms). From these results he concludes that, notwithstanding an absence of free hydrochloric acid and the presence of marked motor insufficiency (conditions usually

considered most favorable for the production of lactic acid), this acid need not be produced after the introduction of carbohydrate food; a third factor is necessary for its production. In 13 out of 14 cases of cancer of the stomach lactic acid was found in rather large quantities (from 0.13 to 0.382 per cent.), though the stomach had been previously washed out and the test-meal had remained in overnight. In 4 cases it was found very early in the course of the disease, long before the tumor could be palpated. The conclusion is, therefore, reached that lactic acid, as found by this new method, is an early diagnostic sign of cancer of the stomach. Boas, however, draws attention to the fact that the absence of lactic acid is not necessarily indicative of the absence of cancer. Oppler, of Berlin,⁶⁹_{Jan. 31, '95} who has been carrying on researches in Boas's polyclinic, states that lactic acid is found in the gastric contents in large quantities in those cases of cancer in which marked motor disturbance is associated with an absence of free hydrochloric acid. In these cases sarcinæ are always present. It may be found in those cases of cancer in which the motor functions are normal and free hydrochloric acid is absent. Here sarcinæ are always absent. Lactic acid is never found when the motor function is disturbed and free hydrochloric acid is present. Sarcinæ are found in these cases.

Oppler has discovered peculiar, slender bacilli grouped in chains in those cases of gastric cancer in which lactic acid is formed. Inasmuch as he was unable to cultivate these organisms on any known media, he cannot state what relation they bear to the production of lactic acid in the stomach. F. B. Turek, of Chicago,⁶¹_{Mar. 2, 9, 16, '95} regards the presence of lactic-acid micro-organisms as so constant in carcinoma of the stomach as to be of great aid in the early diagnosis.

Friedenwald, of Baltimore,¹_{Mar. 23, '95} from numerous personal observations, confirms Boas's statements in an able and complete *résumé* of the subject, and concludes that lactic acid is not formed during digestion in the normal or in the diseased stomach, excepting in cancer, but that in this disease it is usually produced in great quantities. Furthermore, he believes that Uffelmann's test is to be relied upon only in those cases in which the reaction is very marked and decided, and never unless the stomach has been previously carefully washed and a simple flour test-meal ingested. Similar views are expressed by A. Seelig, of Königsberg,⁴_{Feb. 4, '95} who tested Boas's methods in fifteen cases, and Pariser, of Berlin⁶⁹_{No. 4, '95}; A. Schüle, of Heidelberg³⁴_{No. 38, '94}; H. Strauss, of Giessen¹¹⁴_{B. 26, H. 5, 6; B. 27, H. 1, 2}; A. Hammerschlag⁴_{Oct. 8, '94}; Mintz¹¹⁴_{H. 1, 2, p. 126}; and D. D. Stewart, of Philadelphia,⁹_{Feb. 16, '95} who suggests the possibility of the production of a

lactic-acid enzyme through the specific agency of the carcinoma, as an explanation of its presence.

A few cases have been reported in which lactic acid was found in non-cancerous conditions, among them one by M. Bial, of Berlin ^{Feb. 11, '95}₄; Thayer, of Baltimore ⁷⁶⁴_{No. 31, '93}; and Rosenheim ⁴_{No. 39, '04}; but, inasmuch as the examinations in the two latter were made before the introduction of the new form of test-meal mentioned, and before all the necessary precautions were known, they lose their importance. In Bial's case, however, autopsy revealed the disease to be ulcer of the stomach with atrophic gastritis and gastrectasis, and yet lactic acid had been found by Boas's method after Boas's test-meal had been given. Although no tumor could be felt, the case was thought during life to be one of gastric carcinoma, owing to the absence of hydrochloric acid and the large quantities of lactic acid present.

Another patient, seen by G. Klemperer, of Berlin, ⁶⁹_{No. 14, '95} ⁶⁷³_{Mar.} a man 57 years of age, had suffered from cachexia so characteristic that a diagnosis of gastric cancer was made at first sight. Palpation showed the presence of irregular tumors of the liver, and cancer of that organ was diagnosed, but, on account of the anorexia from which the patient suffered, cancer of the stomach was also admitted. No lactic acid was found in the gastric juice, and post-mortem examination showed the stomach to be normal, while the liver was the seat of a large carcinoma. Klemperer, therefore, although he had previously found lactic acid present in all of fifteen cases of cancer, is not inclined to admit without reserve that it is a pathognomonic sign, since he had not found it in three other cases of gastric cancer, one of which came to autopsy. It seems to him that a lessened contractility of the stomach may account for its appearance, as he has observed that it was always present in cases in which there was a stagnation of the stomach-contents, as in cancer or ulcer, with stricture of the pylorus. He has also met with it in the later stages of heart disease and uræmia, and even in one case of simple gastric catarrh. However, it is a fairly reliable sign of cancer, which should always be thought of when its presence is ascertained.

Hammerschlag, of Vienna, ³_{May 22, '95} from a study of thirty-seven cases of cancer and three hundred cases of other gastric disorders, claims that in cases of contraction of the stomach carcinoma may be certainly diagnosed without any clinical symptoms by examination of the gastric contents, which show a constant deficiency of free hydrochloric acid and an excess of lactic acid with a diminution of pepsin. Histological examinations may show atrophy of the pepsin-glands.

[Although regarding absence of hydrochloric acid as a diagnostic sign of great value, I have collected and reported, in connection with Leredde, twelve cases in which cancer of the stomach was accompanied by excess of hydrochloric acid. The size and situation of the cancerous growth afford an explanation for this. If it remain limited to the pyloric region, the greater part of the gastric mucous membrane is uninvolved and performs its functions normally; if, before the appearance of cancer, there were excess of hydrochloric acid, the condition will persist to the end; if the tumor almost completely involve the stomach, there will be either absence or, at least, deficiency of the acid.—A. R.] A case seen by J. W. Felty, of Abilene, Kansas, ⁹May 18, '95 verifies this statement. Hydrochloric acid being present with hæmorrhage, cancer of the stomach was diagnosed, and autopsy revealed an ulcer as large as a silver dollar on the greater curvature, in close proximity to the pylorus,—in fact, extending into it with a scirrhus at the pylorus, forming a stricture, the calibre being that of a large goose-quill. The stomach was somewhat dilated and congested. The scirrhus was confined to the pylorus, and did not involve any of the contiguous organs or tissues.

An instance in which the disease began with an excess of gastric juice, which later on disappeared altogether, was seen by Mathieu, of Paris. ⁹²⁰May 10, '95 Catrin, in the discussion, said that he had observed an analogous case; it was only by the chemical examination of the gastric juice that the nature of the malady was diagnosed. The subject was likewise young, and the cancer took three years to develop, as in Mathieu's patient. A rapid course is not uncommon in young patients, according to Mathieu; and this variability in the duration frequently serves to obscure the diagnosis. Osler, of Baltimore, ¹¹²Jan., '95 had under observation a man, aged 54 years, who had suffered from dyspepsia for eighteen years, and in whom acute and uncontrollable vomiting came on suddenly without any previous exaggeration of the existing dyspepsia. The vomiting was of an extremely offensive, almost fæcal, odor, due to sloughing of the cancer. Death took place in two weeks. Autopsy showed a diffuse infiltrating carcinoma of the body of the stomach of considerable duration. An interesting feature of the case was that the man had suffered for eighteen months from vertigo of the type of Ménière's disease, this being completely relieved by the correction of errors of refraction.

Among the various symptoms of gastric cancer enumerated by Manges ⁵⁹Apr. 27, '95 are: the sudden onset, without apparent cause, in a person previously free from any stomach trouble; more or less marked anorexia, early repugnance to meat, disturbed motor

power, and absence of free hydrochloric acid, pepsin, and rennet-ferment.

In two cases seen by Devic and Chatin, of Lyons, ³⁰⁴_{No. 30, '96} the disease assumed all the signs of pleural effusion until death was imminent, the diagnosis being only made by the presence in the effusion of cells the nature of which were ascertained by the microscope. The cases were found post-mortem to be gastric cancer with metastases in the pleura. Jasienski ²⁰⁰⁰_{'96} describes a latent form which in three cases gave rise to chronic icterus by metastasis, the primary affection being only discovered at the autopsy.

Babes and Stoicesco, of Budapest, ⁷³_{Feb. 23, '96} have discovered that the microscopical examination of small, subcutaneous, metastatic tumors may be of considerable value in diagnosing cancer of the internal organs. In one case the generalization of cancer in the skin and subcutaneous cellular tissue, observed during life, constituted an important sign of cancer of the stomach at a point where the diagnosis was almost impossible.

G. Carrière, of Bordeaux, ²⁵_{Aug., '96} describes in detail a case of latent cancer of the stomach in which the only symptom was an intractable diarrhœa, coming on without appreciable cause and accompanied only by marked adenopathy of the inguinal region. The author advances the hypothesis that the fatal result in his case might be explained by irritation of the hepatic cells by the cancerous toxins,—an hypothesis warranted, in his opinion, by the fact that there was advanced fatty degeneration of the liver, while the cancer of the stomach was not of an advanced or extensive nature. A similar theory of infection by cancerous toxins was advanced by Lubarsch, of Rostock, ³¹⁹_{Oct. 6, '96} to explain the degenerative processes found in the spinal cord in six cases of carcinoma ventriculi reported by him to the German Congress of Scientists and Physicians in September, 1895. In the discussion of this paper Schultze, of Bonn, expressed some doubt as to the soundness of this view, believing that spinal complications of this nature, as in many other constitutional diseases, may be due to disturbed nutrition. The autopsy in a case reported by J. W. Felty, of Abilene, Kansas, ⁹_{May 18, '96} revealed an interesting and rare condition. The stomach was so contracted by a scirrhus that the total capacity was only 3 ounces (90 grammes). The omentum, transverse colon, stomach, and pancreas were all agglutinated in an almost inseparable, diseased mass. The gall-bladder, gall-ducts, and lower part of the liver were carcinomatous. The gall-bladder contained nothing but a small amount of mucus. The other organs were normal. The patient had been ailing for six months, and the author presumes that the stomach was practically of the

same size for months. There was a nodular mass in the left mammary gland and several enlarged glands in the axilla. Ch. Achard, of Paris, ³¹_{Oct. 12, '94} describes an interesting case of a man, aged 57 years, who suffered from an umbilical fistula which gave exit to pus. A diagnosis of gastric cancer opening into the umbilicus was confirmed by the autopsy. There were several cancerous nodules in the liver.

In a rare case of primary cancer of the stomach observed by Stroup, of Nancy, ³¹_{Oct. 12, '94} metastasis occurred in the liver and lymphatics, affecting the angiomatous or hæmorrhagic form. Unusually numerous metastases were met with post-mortem by C. F. Martin and A. A. Robertson, of Toronto, ²⁸²_{Sept., '95} in a case of carcinoma of the cardiac end of the stomach. Peritonitis occurred without perforation shortly before death in two cases under the care of J. Michell Clarke, of Bristol, ¹³¹_{Sept., '95}—a rare complication. The necropsy in one of them disclosed a large mass of new growth at the pylorus. Over the growth the peritoneum was thickened and covered with a layer of lymph, the fat was indurated, and the liver and under surface of the diaphragm were coated with recent lymph. The inflammation was confined to these situations. No perforation was found, but the growth in one place was excessively thin, and here the most marked changes in the peritoneum occurred. In the other case the peritonitis was general and there was effusion into the pleural cavity. Cancer of the pyloric end of the stomach, associated with gall-stones and a pediculated angiolipoma of the peritoneum, was diagnosed by David Riesman, of Philadelphia, ⁴⁵¹_{Apr., '95} who describes in detail the post-mortem appearances; and Sürmay, of Ham, France, ¹⁴_{Oct. 16, '95} gives notes of a case of gastric cancer complicated with multiple phlebitis of the extremities,—a condition which Jaccoud ¹⁴_{No. 60, '95} considers as dependent on the growth in the epigastrium.

Treatment.—The idea of using chlorate of sodium in cancer of the stomach is due, Huchard states, ³⁵_{Sept. 5, '94} to the local beneficial effects of chlorate of potassium upon epithelioma of the upper part of the digestive tract and upon similar lesions of the skin. The latter salt cannot, however, be administered internally in large and continued doses without producing toxic effects. The chlorate of sodium is hardly toxic even with doses of 10 to 16 grammes ($2\frac{1}{2}$ to $4\frac{1}{4}$ drachms); it is more soluble than the potassium salt and is eliminated more rapidly. It is administered by dissolving in 150 to 200 cubic centimetres (5 to 7 ounces) of water and taking a dessert-spoonful at a time through the day in order to exercise a continual local action upon the growth and also upon the mucous membrane of the stomach. The dose of 16 grammes ($4\frac{1}{4}$ drachms)

ought never to be exceeded, and even this cannot always be tolerated, owing to gastric irritation and vomiting. Patients submitted to this treatment for over a year have been certainly relieved, the appetite improved, pain diminished, vomiting and even hæmatemesis ceased; there was also a favorable action upon the secretion of hydrochloric acid and the patients improved in nutrition. As to the curative properties of the drug, further and long-continued observations are necessary before any statement can be made. In the meantime it is a considerable gain to relieve the functional symptoms in a disease so incurable as cancer.

A. Jacobi, of New York, ⁵⁹_{Feb. 2, '95} is convinced of the efficacy of methylene-blue. A hundred cases of carcinoma seen within the past five years have strengthened his belief that few patients fail to be relieved and improved by it, while nearly all tolerate it, if begun in small doses, as 1 or 2 grains (0.065 or 0.13 gramme) daily.

Pyloric Stenosis.

Visible peristalsis of the stomach in stenosis of the pylorus has been discussed by several writers during the year. While normally the human stomach is engaged in active movement only during the digestive process, it may, under certain pathological conditions, display more constant rhythmic movements, which are seen in the form of waves passing from the cardiac toward the pyloric end, but occasionally in the reverse direction. This peristalsis has been attributed to stenosis of the pylorus; but the acceptance of this view without qualification is made difficult, according to T. K. Monro, of Glasgow, ²¹³_{Feb., '95} by the fact that, in numerous cases of pyloric obstruction, there are no such visible movements, while, on the other hand, peristalsis may occur in the absence of obstruction from stenosis. Hanot and Meunier, of Paris, ⁵⁵_{Oct. 27, '94} mention the case of a woman, aged 64, the subject of marked peristaltic movements of the stomach. She suffered from cancer which was supposed to be of rapid growth, and which quickly led to stenosis of the pylorus. The stomach, being thus suddenly, as they believe, embarrassed in its movements, got into a state of tetanus in its endeavor to overcome the obstruction, and its contractions ceased only when it became exhausted. The authors admit that further observations are desirable. A similar instance is recorded by L. Bigaignon, of St.-Ouen-l'Aumone, ³⁶⁰_{July, '95} Matton, of Dax, ³_{Aug. 21, '95} having recently observed visible peristaltic movement in an old case of pyloric cancer, hesitates to indorse the opinion of Hanot that it is a sign of the rapid evolution of the growth.

Two cases of tetany are recorded by W. Soltau Fenwick, of London, ⁶_{Oct. 20, '94} in patients with dilatation of the stomach due to stenosis following chronic ulcer at the pyloric end of the organ. One patient died from spasm of the muscles of respiration, the other improved under lavage. Of twenty-six reported cases, in 92 per cent. the dilatation was shown post-mortem to be due to chronic ulceration at the pylorus. G. W. Barber, of Brindisi, ⁶_{Mar. 9, '95} also observed a case of severe vomiting accompanied by tetany in a man who had never had any symptoms of gastric ulcer and showed no signs of dilatation of the stomach, but had a very similar attack four years previously, lasting eight days, while voyaging between Calcutta and Aden.

Fleiner, of Munich, ³¹_{Jan. 16, '95} from observation of three cases, explains these attacks by a reflex action, each attack being preceded by a feeling of discomfort in the pyloric region, with a diminished excretion of urine. The stomach increased in size, there were spasmodic contractions of the pylorus, and the pulse, usually accelerated, fell to 60 per minute. The stomach becoming filled by hypersecretion, fermentation, or deglutition of air, vomiting occurred, and the sudden contraction of the stomach-walls caused tonic convulsions, beginning in the extremities and rapidly extending to all the muscles of the body.

Treatment.—As regards the treatment, Bigaignon recommends pylorotomy or gastro-jejunostomy in cases of severe non-malignant stricture. Where surgical interference is refused or is not advisable, Einhorn, of New York, ⁵⁹_{Jan. 19, '95} advises small and frequent meals, milk, kumyss, or matzoon, being suitable lavage, in a fasting condition, followed by a stomach-spray of 1 to 3000 solution of nitrate of silver. Rectal alimentation will greatly aid the usual nutrition for a time, and rectal injections of water, first recommended by Unverricht, will be of great benefit when thirst is present and the amount of urine decreased. In benign stenosis of the pylorus massage (ten minutes twice daily) to the gastric region, the administration of alkalies for hyperacidity, and the application of the galvanic current when there are severe pains may be very profitably tried. Cancerous stenosis of the pylorus hardly admits of any treatment. Condurango for anorexia and chloral hydrate (a teaspoonful of a 3-per-cent. solution every two to three hours) for pains, as recommended by Ewald, are the most reliable and efficient medicaments.

Tuberculous Disorders of the Stomach.

Pathology.—Tuberculosis of the stomach is rare, Letorey ²⁰⁰⁰_{'95} being able to collect only twenty-one cases. This rarity is ex-

plained by the action of the gastric juice on the Koch bacillus, which cannot live in an acid medium, either dying or losing its virulence. Absence of hydrochloric acid or its diminution would, therefore, favor the development of tubercular lesions, as would also ulcer, gastritis, and particularly alcoholic gastritis. Some authors claim that the bacillus enters the stomach with the food, the ingestion of infected meat being the most frequent source; others assert that the swallowing of tuberculous sputum is the cause of the infection. Letorey, on his side, believes that the bacilli enter the stomach through the circulation. However this may be, tuberculosis of the stomach is nearly always secondary. Other important organs being involved, the lesion of the stomach, which presents no pathognomonic sign, passes unnoticed and is only discovered at autopsy. The usual site of the ulceration is near the pylorus and on the great curvature. In only six cases was more than one such ulceration noted; so that the lesion may be said to be generally single, rounded or oval, with ragged and bleeding edges and a grayish-yellow base. The ulcer sometimes reaches a diameter of from three to five centimetres. The prognosis in these cases is grave, since the patient is generally cachectic, and usually dies from the effects of the primary disease in the lungs or other organs, the gastric complication perhaps hastening the fatal issue.

In a case reported by Adami, of Montreal, ²⁸²_{Mar., '95} an ulcer thirteen millimetres in diameter was found in the centre of the great curvature, in the muscular coat of the viscus, while corresponding to it in position upon the serous coat was an area of confluent tubercles. The patient was a girl of 10 years, who died from advanced and extremely generalized tuberculosis, which, from the caseous condition of the mesenteric glands, the author was inclined to regard as having first manifested itself in the alimentary tract, although it would certainly be possible to urge also that the disease began in the lungs.

Diagnosis.—Fenwick, of London, ¹⁰⁷⁷_{Oct. 24, '94} in a lecture on the strumous dyspepsia of children, states that mild cases of strumous dyspepsia are very common and usually escape notice, but that the more severe forms immediately claim attention. Of 200 cases of disease in children during the past year in his service, 32 suffered from the disorder. In the majority of cases there is a strong family history of tuberculosis, and usually some of the brothers or sisters of the patient suffer from scrofula. The disease usually appears about the age of 5 years, and in addition to the general tuberculous aspect there is usually some local manifestation, such as chronic enlargement of the cervical glands, hyper-

trophy of the tonsils, or phlyctenular ulcers of the cornea. Anæmia is always a noticeable feature, while pain in the abdomen is the most constant and characteristic symptom. It comes on suddenly, lasting from a few minutes to several hours, the face being flushed with free perspiration, although at times great pallor is present. The pain is described as a griping or twisting sensation in the region of the transverse colon, though occasionally the right iliac region or the hypogastrium is indicated as the chief site of suffering. Constipation, exhaustion from want of food, and excessive mental or physical fatigue are the principal factors which seem to excite an attack.

As a rule the appetite is poor and extremely capricious, and the patient exhibits an intense dislike to most forms of fat, especially that of mutton, beef, and pork. Bacon-fat, on the other hand, is often agreeable, and milk, butter, and codliver-oil never give rise to any unpleasant symptoms. Occasionally dislike is expressed for the carbohydrates, and saccharine materials are found to occasion flatulence, acidity, or nausea. Many of the patients also develop a special liking for certain articles which are usually regarded as the reverse of digestible or nourishing, vinegar and lemons enjoying an extreme degree of popularity. Thirst always constitutes a prominent symptom, and is chiefly complained of during the night or early morning.

Although the ordinary symptoms of gastric disease, such as nausea, acidity, and flatulence, are usually absent in these cases, it occasionally happens that a sudden change in the atmospheric conditions or some slight indiscretion in diet will induce an attack of subacute gastric catarrh. Under these circumstances the patient awakes in the morning with headache, and complains of nausea and a foul taste in the mouth. The appetite is in abeyance, but thirst is excessive. The face appears pale and puffy, and dark lines make their appearance beneath the eyes. The breath is sour and the dorsum of the tongue covered with a thick white fur, while the tip and edges are of a vivid-red color. The pulse is slightly quickened and the temperature raised a degree or so above the normal. Nausea is a persistent symptom, and retching or vomiting follows every attempt to partake of food. As a rule diarrhœa complicates the gastric disorder, but occasionally constipation is observed. These catarrhal attacks last from two to five days, and are apt to recur from time to time.

After the age of puberty the various symptoms of the complaint generally subside, but the patient may still be subject to occasional attacks of gastric catarrh. In some instances, however, the disease undergoes a kind of evolution, and the stomach, rather

than the intestine, eventually becomes the chief seat of the disorder. Fenwick regards the affection as essentially a neurosis of the intestinal tract associated with extreme difficulty of digestion and absorption of neutral fats, both conditions being dependent upon the strumous dyscrasia.

Miscellaneous Disorders of the Stomach.

Hour-glass Stomach.—Saake²⁰_{B.134} performed a post-mortem examination in a case of hour-glass stomach, there being two compartments of about the same size. The formation appeared to be congenital and to have been brought about by a peculiar course and grouping of muscular fasciculi radiating from the œsophagus. A carcinoma of the pyloric portion had been the cause of death. Grünwald, of Greifswald,³¹_{Jan.16,'95} found a similar condition at the autopsy of a woman of 32 years, who suffered from incoercible vomiting and constipation, and in whom an artificial labor at the seventh month was followed by death; and Karl Hirsch, of Charlottenburg,²⁰_{B.140,H.3,'95} describes another instance discovered post-mortem in a woman, 67 years of age, who died from blood-poisoning due to a wound in one of her fingers from a rusty needle.

Injuries.—A case of spontaneous laceration of the stomach is described by R. Brayn and J. B. Ridley, of Woking,²_{May 25,'95} in a strong, well-nourished woman, aged 37 years, who, after eating her dinner, vomited a small quantity of blood, rapidly became unconscious, and died in about half an hour. A necropsy was made twenty-four hours after death. No external signs of injury or disease. The abdominal cavity contained about 10 ounces (310 grammes) of bloody serum. The stomach was much distended, and in the anterior wall at the cardiac extremity was a distinct rent, about three-fourths inch long, through the entire thickness of the wall, and extending about one-fourth inch farther through the serous coat only. The organ contained pieces of imperfectly masticated meat and other material which appeared to be bread. The mucous membrane was free from all signs of disease and appeared perfectly healthy, only a slight redness, such as normally exists during digestion, being apparent. The walls of the stomach were thick and strong and displayed no appearances of degeneration or softening. The diaphragm and muscular walls of the abdomen were very strong and well developed, and the remainder of the abdominal organs were normal.

Spontaneous laceration of the stomach would appear to be a very rare occurrence. Its possibility is denied by some, but Taylor²⁰¹⁶ gives several examples. In this patient it was certainly

not the result of any external injury or violence, but would appear to be due to violent contraction of the stomach itself upon a mass of undigested food, accelerated by the action of a strongly-developed diaphragm and abdominal muscles.

A case of sudden death from rupture of the stomach into the left thoracic cavity is recorded by Czernicki.²¹³ It was learned that the patient had suffered from abdominal pain after wrestling; and on post-mortem examination the left pleural cavity was found to be occupied by the greatly-distended stomach, which had gained entrance through a rent in the diaphragm and had compressed the left lung. The margins of the opening in the diaphragm appeared in process of cicatrization. The stomach presented a triangular perforation on the greater curvature, surrounded by an area of inflammation. Laurencin²¹¹ also reports a fatal case of traumatic rupture of the stomach.

Concretions.—Paul Manasse, of Strasburg,⁴ describes a curious gastric concretion in a man, aged 44, addicted to alcohol and who died of a rapid tuberculosis of the lungs and diaphragm. The necropsy revealed a deep chronic ulcer of the stomach situated close to the pylorus and causing adhesion of this part of the stomach to the liver. Beside the ulcer was a calculus, of flattened, cylindrical form, measuring 10 centimetres in length, 5 centimetres in width, and 4 centimetres in thickness, and weighing only 75 grammes (2½ ounces). It was very dark green in color, of a resinous appearance, showing a laminated structure. Chemical examination confirmed the view that the concretion was of a resinous material resembling shellac. The patient was a joiner, and Manasse ascertained from his employer that the man had habitually drunk shellac-polish; this undoubtedly precipitated in the stomach to form the calculus. In this case there was only one concretion, but in a case described by Carl Friedlaender there were many shellac-stones in the stomach and intestines, giving rise to fatal ileus; while in a case reported by Langenbuch two concretions (one in the stomach and one in the intestines) were likewise of shellac.

Miscellaneous.—William Vissman, of Louisville,¹⁹ found a phlegmon of the stomach in the post-mortem examination of a woman, aged 50 years, in whom carcinoma was diagnosed before death. The entire stomach was involved by the phlegmon. This case is the only one seen by the author in ten thousand post-mortem examinations. Minor Morris, of Indianapolis,⁴⁵¹ at the autopsy of a man 53 years old, of good habits, who had died after an illness of eighteen months, found chronic hypertrophic cirrhosis of the stomach. The abdominal symptoms had been obscure.

Persistent Vomiting.

Three remedies have often proved valuable in the hands of A. Jacobi, of New York.⁵⁹ One is the tincture of iodine, in $\frac{1}{2}$ - to 1-drop doses every one, two, or three hours; the other is arsenious acid, in doses of 0.0003 or 0.00022 gramme ($\frac{1}{2000}$ or $\frac{1}{3000}$ grain) every two or three hours, and zinc, either the valerianate from 0.75 to 1.25 grammes (12 to 20 grains) daily in divided doses, with or without bismuth, or the oxide in four or six daily doses of from 0.02 to 0.05 gramme ($\frac{1}{3}$ to 1 grain) each.

In a case of nervous vomiting in a little boy, J. B. Marvin, of Louisville,¹¹⁵⁰ Apr., '95 gave $\frac{1}{10}$ or $\frac{1}{12}$ grain (0.006 or 0.005 gramme) of bichromate of potassium well diluted, two to three times daily on an empty stomach, with excellent results. J. B. Bradbury, of Cambridge,⁶ Sept. 14, '95 has also found this drug useful in five cases, and classes it under the head of gastric tonics. Faradization of the pneumogastric nerves, advocated by Larat and Gautier¹⁰⁸ p. 242, '95 and Champetier de Ribes,⁹²⁰ Mar. 8, '95 appears to G. Bonnefin¹⁵² Sept. 20, '95 to be the method of choice in incoercible nervous vomiting. It presents no danger and permits of immediate alimentation of the patient. A current of from 8 to 10 milliampères is sufficient, care being taken to increase and diminish slowly the intensity of the current on opening and closing circuit. From one-quarter to one-half hour will be sufficient, though the *séance* should be repeated several times daily in severe cases.

C. L. Greene⁹ July 6, '95 proposes an ingenious plan of treatment for cases of persistent vomiting, but, as the author does not appear to have had an opportunity of testing its value in practice, it will receive attention in a later issue of the ANNUAL.

Hiccough.

Etiology and Pathology.—This subject has received a considerable amount of attention during the past year, the impetus being furnished by a fatal case described by D. B. McCartie, of Newark, N. J.⁵⁹ Dec. 1, '94 This patient, a bartender, aged 28, of good habits and family history, an active, strong man, weighing 150 pounds (68.2 kilogrammes) and of middle height. For years previous to the attack which led to his death he noticed that on being shaved by his barber, when the razor touched a circumscribed spot on the side of his chin, at the edge of the inferior maxillary bone beneath the mental foramen, a trifling scratch instantly brought on an attack of hiccough. This happened repeatedly, but the reflex action never continued longer than for a few seconds. He always could check it by the usual domestic remedies, as sipping water, holding

the breath, etc. The last and fatal attack began after he had been shaved, and lasted five or six weeks, after which he died of exhaustion. The hiccough was almost continuous, except during sleep and for some short periods. After a day or two the case aroused much popular interest. As a consequence, cure after cure was recommended and tried. Among thousands of popular devices nitrite of amyl was oftenest recommended, even outside the medical world. Massage succeeded on several occasions in temporarily relieving the hiccough, once for as long a period as a week. McCartie considers that in this, as in any other hysterical affection, the trouble is prolonged by attention. The current belief is that hiccough is a reflex spasm of the diaphragm with simultaneous closure of the glottis, the pneumogastric being the afferent nerve concerned and the phrenic and recurrent laryngeal the efferent nerves.

W. Langford Symes, of Dublin, ¹⁶_{Jan., '96} however, questions this agency of the phrenic nerve, which has been strongly supported by Leloir, of Lille, ¹¹⁸_{Mar., '92} but thinks the sympathetic connections of the semilunar ganglion far more likely to be involved. For this he gives the following reasons: 1. The diaphragm appears to contract before the laryngeal muscles, and this points to a closer and more direct communication with the gastric portion of the vagus than with even the recurrent laryngeal. 2. The course of the phrenic nerve is healthy and its respiratory function perfect. 3. The patient has no control over the spasms, whereas the phrenic nerve is always subservient to the will. 4. Remedies applied to the origin or over the course of the phrenic nerve or to the cervical spine—such as blisters, ice-bags, compression, etc.—have no effect, while those directed to the diaphragm, the stomach, and the solar plexus are generally effective. 5. The connection between the pneumogastric and phrenic nerves by means of the third, fourth, and fifth cervical nerves is remote, and were this the route taken the impression must travel more than double as fast on the phrenic nerve than it does on the recurrent nerve, since it reaches the diaphragm before the larynx,—conditions, the author remarks, which are unphysiological. 6. Romberg's and Bright's experiments show that direct irritation of the phrenic nerve will not produce hiccough. 7. There is a perfect reflex loop between the stomach and the diaphragm which answers the purpose more directly, separated from the function of respiration and beyond the patient's control. 8. Hiccough is influenced by swallowing and by vomiting to a greater degree than by any respiratory effort. Symes describes a case in a gouty old man of 87 years, in whom he concluded that the hiccough probably arose from some œsopha-

geal irritation to the branches of the vagus, associated with a catarrhal state of the cardiac orifice of the stomach, gouty in its nature, and that an attack of articular gout would probably clear it up.

Henry Levien, of New York, ⁵⁹_{Jan. 5, '95} from two cases of his own and that described by McCartie, is inclined to believe that, besides the typical singultus, which is only a symptom pure and simple, there exists another form of it which is a disease *per se*, the etiology of which is not yet known. This view, however, is not shared by J. O. Leonhardt, of Lincoln, Neb., ⁶_{Aug. 24, '95} who assigns it to a class of imposing symptoms, of which neurasthenia, dropsy, jaundice, fever, etc., are examples. This assertion is based on the study of forty-one cases collected from literature. Cases of apparently neurotic origin are recorded by J. P. Wightman, of Rawdon ⁶_{June 1, '95}; W. Wilson, of Florence, ²_{Apr. 27, '95} and A. W. Harrison, of South Croydon ²_{Feb. 23, '95}; while in those reported by Denhaene, of Bruges, ⁴⁵⁴_{May, '95} and R. W. Parsons, of Sing Sing, ⁵⁹_{Feb. 23, '95} a traumatic origin might be ascribed.

Treatment.—As Symes justly remarks, ¹⁶_{Jan., '95} the treatment of obstinate hiccough will ever be a matter of extreme difficulty on account of the multiplicity of remedies. It might be advantageously divided into (1) empirical, (2) antispasmodic, and (3) physiological. Under the first heading would come almost every known drug or household remedy, the most efficacious of which he has found to be very frequent acts of swallowing saliva, sips of liquids, or spoonfuls of arrow-root, so as to prolong the act of deglutition and thus exhaust the pneumogastric nerve. Raw whisky, vinegar, and “eau de melisse” act frequently like magic; also hot brandy-punch or a mustard-blister over the epigastrium. Of antispasmodic remedies chloral hydrate was used with success in Syme’s own case, referred to above, and might be replaced by such as nitrite of amyl, Calabar bean, cocaine, hydrocyanic acid, atropine, morphine, nicotine, conium, or succinum. The physiological treatment, however, will depend upon an accurate diagnosis of the conditions under which it occurs, of the constitution in which it is met with, and of the probable nature of the irritation to which the gastric or œsophageal branches of the vagus are subjected.

D. L. Parker, of Detroit, ¹⁸⁵_{Oct., '94} has cured several cases of severe hiccough by dry cupping of the abdomen. Spasm occurred in all four cases reported in about two hours; repetition of the cupping caused a permanent arrest of the hiccough. An ordinary drinking-glass may be used, the air being exhausted by burning paper or a few drops of burning alcohol. In removing the glass care

should be taken to press lightly upon the skin near the edge of the glass with a pencil or other pointed instrument, and allow the air to pass in gradually. Forcible removal is quite painful. J. E. Pauzat³⁵_{Apr. 20, '95} recommends what he calls a new method, energetically pressing the soft part of the thumb against that of the little finger. By this means the author has always been able to arrest the hiccough when it is taken in the beginning, and he has recommended the employment of this method to others who have used it with good results. The inhibitory effect is, without doubt, he says, due to compression of the numerous nervous branches in the soft part of the fingers.

A case of hiccough lasting seventy-two hours without cessation was finally treated by Ferguson, of Camden-town, ⁶_{Feb. 16, '95} as a last resource, by injecting below the skin of the arm 6 minims (0.39 gramme) of a solution containing $\frac{1}{60}$ grain (0.001 gramme) of atropia and $\frac{1}{2}$ grain (0.03 gramme) of morphia. The dose was large certainly, but the same quantity of morphia had been already injected without producing any further effect than a little drowsiness. In five minutes the patient was fast asleep, and the hiccough had entirely ceased. In two hours symptoms of poisoning developed, the face and lips being cyanosed and the breathing stertorous, slow, and labored. Tickling the soles of the feet restored consciousness so that he answered questions and swallowed some coffee. After another hour's sleep his breathing became so obstructed that he was again awakened, this time with far less difficulty than before. Next morning he complained of nothing except some stiffness of the neck and difficulty in swallowing, and in a few days he regained his normal condition. There was no return of the hiccough. P. Slevin, of West Drayton, ⁶_{July 13, '95} cured a case of hiccough, which had been constant for twelve days and resisted all treatment, by giving the patient a very pungent snuff, which caused violent sneezing and the disappearance of the hiccough.

Hæmatemesis.

In a study of hæmatemesis, Ewald¹¹³_{Mar. 17, '95} ¹⁴⁷_{Sept.} formulates the following conclusions: 1. Hæmorrhage from the stomach is more frequent than vomiting of blood. When stomach hæmorrhage is suspected, it is important, when vomiting is absent, to examine the stool, and then it is only possible to demonstrate the presence of blood by careful microscopical, spectroscopical, or chemical examination. 2. Dark, black-brown coloration of the stomach-contents indicates, in many, but not all cases, the presence of blood; therefore, mere inspection of the stomach-contents is not

always positive in indicating hæmorrhage of the stomach. In doubtful cases, spectroscopical, chemical, or microscopical examination is necessary. 3. The positive results afforded by the guaiacum test do not always show the presence of blood; the negative result of this test, however, excludes blood. 4. The examination of the suspected stomach-contents with concentrated acetic acid and ether and the treatment after this manner of the ethereal extract with tincture of guaiacum and turpentine constitute the quickest and most positive test for the presence of blood. 5. Hæmorrhage of the stomach often occurs periodically in connection with menstruation and its anomalies, and is best specified as "menstrual hæmorrhage of the stomach." Periodical hæmorrhage of the stomach in connection with amenorrhœa stands in genetic relation to this menstrual anomaly. It must not, however, be regarded vicarious in the sense that gastric hæmorrhage is a physiological condition substituting menstruation. 6. Gastric hæmorrhage in *ulcus ventriculi* often occurs periodically and bears a certain relation to menstruation. 7. Menstrual hæmorrhage of the stomach must awaken the suspicion of a latent gastric ulcer. In such a case a typical rest-cure of Leube is indicated; the futility of such treatment contra-indicates the diagnosis of gastric ulcer. Similar conclusions are arrived at by Kuttner, of Berlin. ⁴ Fer-
rand, of Paris, ¹⁴Apr. 7, '95; ⁷⁹June presented to the Société Médicale des Hôpitaux specimens obtained from the stomach of a woman, 25 years of age, who was received into the hospital with symptoms referable to a gastric disturbance accompanied with severe dyspeptic pains. This woman, before her entrance, had had hæmatemesis on several occasions. She was cachectic and feeble. Toward the end of February she had a very severe attack of hæmatemesis, and later distinct symptoms of peritonitis. She was subsequently attacked with parotitis, which swelled to an extraordinary size and made it necessary to transfer her to the surgical ward for operation. She was then attacked with pneumonia and died. The autopsy led to the discovery that the profuse hæmatemesis was produced without the presence of any simple ulcer. There were only some slight ulcerations on the mucous membrane, but no trace of any *ulcus simplex*.

Rumination.

Cases of human rumination are not very numerous, or, to be more accurate, do not often come under the eye of an observer. But cases in which hereditary transmission plays a part are still rarer; from this point of view three cases of rumination in grandfather, father, and child, reported by E. C. Runge, of Boston, ⁹⁹May 23, '95

are of interest. The grandfather was for many years in the habit of regurgitating coarse particles, ejecting them, however, without remastication. Heartburn was complained of at times, but was not coincident with the regurgitation. The father was a vigorous man of scientific tendencies, but in excellent health. He admitted rumination for ten or more years. The food-stuffs that he masticated consisted principally of lettuce, potato, asparagus, gristly meat, etc. The act occurred at any time after the meal, usually early, but occasionally as long as five or six hours afterward. The tongue was coated and flatulence existed. The child, a boy of 7, had been addicted to the ruminating habit for but a short time, and this was first noticed during a recent transatlantic voyage. Runge, from chemical analysis of the stomach in a previous case of merycism, found no abnormality nor deficiency in the secretory or motile function, and hence feels warranted in regarding rumination not as a pathological entity, but as a physiological anomaly, most probably produced by an awakening of the latent tendency to revert to ancestral types,—a tendency inherent in all living organisms, and too well established to be refused most serious consideration.

Two cases are reported by David Riesman, of Philadelphia,²⁴² June, '95 in which there was a history of imperfect mastication and liberal indulgence in meat, with a deficiency of hydrochloric acid. An interesting case of gastropstosis and rumination with voluntary dislocation of the stomach and kidney is described by Abrams, of San Francisco.⁹ Apr. 13, '95 Dufour²¹² Sept. 10, '95 observed the condition in a patient after a carriage accident, being evidently a case of traumatic neurosis, since no gastric trouble had previously existed. Turmel²⁰²⁴ '94 notes its rarity in women, though it coincides often with many nervous affections. Many authors, indeed, among them Lloyd¹ Jan. 5, '95 and Jacobi,⁵⁹ Feb. 2, '95 regard it as a neurosis; while others, among them W. A. Hammond¹ Jan. 5, '95 and Runge,⁹⁹ May 24, '95 contest this view.

General Therapeutics of Gastric Disorders.

The action of bicarbonate of sodium in gastric diseases has been studied by a number of authors, notably among whom are Linossier and Lemoine,⁶⁷ p. 492, '94 H. Huchard, of Paris³⁵ Feb. 2, '95; A. Mathieu,¹⁴ Dec. 23, '94 N. Reichmann,¹¹⁶ Mar., '95 and Dujardin-Beaumetz, of Paris.⁹⁹⁶ Oct. 10, '94 The last-named authority investigated its effect upon the gastric secretion without reference to its effect upon the motility of the stomach, upon gastric and intestinal fermentation, or its analgesic properties. His conclusions, based upon experimental as well as clinical observation, explain in a logical manner

its paradoxical, but undeniable, action upon two opposite conditions of the stomach, and are substantially the same as those arrived at by Linossier and Lemoine. According to these writers, the drug acts upon the gastric secretion first by exciting and then by depressing it. The excitation is due to the immediate effect upon the gastric glands, while the depressions seem to be due to its general effect, or, in more exact terms, to the alkalization of the blood. In practice moderate doses must be used when it is desired to obtain the excitant action, given before meals, and for a short period only. To obtain the sedative effect, large doses, during or after meals, should be continued for some time. The exact size of the dose cannot be absolutely specified, as this depends upon the state of the gastric secretion, the susceptibility of the stomach to bicarbonate of sodium being in inverse ratio to the quantity of hydrochloric acid secreted. These conclusions apply also to Vichy and other waters containing bicarbonate of sodium. Reichmann made some experiments to determine the direct effect of bicarbonate of sodium upon the gastric secretion. He found, from one hundred and three examinations, that it in no way influenced the secretory power of the stomach, though it does neutralize or render acid the contents. He therefore admits its value, and acknowledges that the long-continued use of weak alkalies will no doubt produce a tonic effect on a weak gastric mucous membrane. Mathieu¹⁰⁰ questions the value of Reichmann's experiments on the ground of faulty technique.

Henri Huchard, of Paris,³⁵ states that hydrochloric acid possesses two very important properties,—eupeptic and antiseptic; it supplies to the gastric juice the acid which is wanting, and therefore is indicated in all conditions in which hydrochloric acid is diminished and with greater reason when it is absent. In the latter case by its presence it can render the pepsin active which otherwise would be inert. This drug is indicated in delayed digestion, deficient secretion of hydrochloric acid, chronic gastritis, cancer of the stomach; in the pyrexias, which almost completely suppress its secretion; in pulmonary tuberculosis; in under-compensated hearts, especially in chlorosis and anæmia, and in certain conditions of the nervous system, as neurasthenia. It is contra-indicated in hypersecretion, gastro-succorrhœa, ulcer, acute gastric affections, cancer secondary to round ulcer, and nervous dyspepsias of the neuropathic and hysteric. Its use should be continued for three or four weeks, omitted for a fortnight, to be again renewed. Large doses, as those recommended by Ewald, 15 drops three or four times after meals, at quarter-hour intervals, are to be avoided. As an antiseptic it prevents abnormal fermentations and the pro-

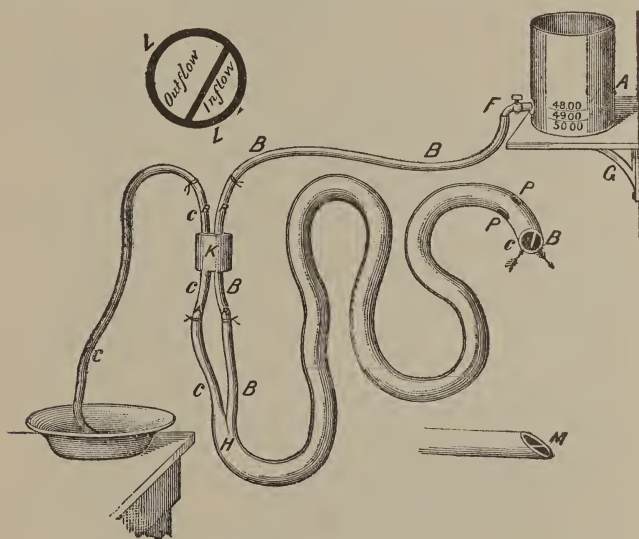
duction of organic acids. It is indicated in dilatation, in certain forms of gastric cancer, in all gastric conditions characterized by fermentation, and in pyrosis due to the formation of acids due to fermentation. In these cases it should be administered some hours after meals, and as an eupeptic during and after the meal. To combine these two effects one dose should be given immediately after a meal and a second one three or four hours later.

The indications for washing out the stomach were freely discussed at the German Congress of Naturalists and Physicians, in September, 1895, the gist of the prevailing opinion being voiced by the conclusions of Martius,³¹⁹_{Oct. 5, '95} viz.: that irrigation of the stomach is positively indicated in acute poisoning, stagnation of the gastric contents from pyloric stenosis, and ileus; that the physician may use his discretion in cases of carcinoma, acute and chronic catarrh, and functional abnormalities, such as hypersecretion. In gastric neurasthenia he sometimes obtained good results from irrigation. Minkowski said that he had performed irrigation for hæmorrhage from gastric ulcer, of course introducing a very smooth tube. Irrigation ought always to be done in the evening, so that the stomach may rest during the night. Leyden⁴_{No. 41, '94} deprecates its too frequent employment, regarding it only serviceable where there was fermentation or where hyperacidity had made the stomach sensitive. Ferrand¹⁴_{May 15, '95} calls attention to the danger of lavage in gastric ulcer, even in the intervals of hæmatemesis; and Bardet¹⁴_{May 15, '95} considers the only true indication to be putrid gastric fermentation with the formation of toxins. Beyond such cases it is useless, if not dangerous.

Ebstein⁴_{No. 4, '96} reports a case in which a piece of the pyloric mucous membrane was found in the fenestrum of the stomach-tube, and he believes that such an accident is not infrequent, being favored by the position and size of the stomach. He advises distension before passing the sound, in order to be able to form an idea of the extent and configuration of the stomach. The sound must be sufficiently thin; must not be removed too rapidly, but slowly, and while water is allowed to run in. The occurrence of vomiting while the tube is in the stomach necessitates special caution. The accidental swallowing of a piece of stomach-tube is recorded by Landström,³⁷⁰_{v. 57, No. 2} the patient being a seamstress who was performing lavage of the stomach for round ulcer, and who swallowed a portion of the tube, forty-eight centimetres long and eleven centimetres wide, solid and somewhat inelastic. She fainted, and for some days after suffered from severe, bloody vomiting, nausea, and intense pain at the pit of the stomach and in the bowels. She was unable to take any nourishment. Eight

days later Landström detected the foreign body, doubled on itself, in the right iliac fossa, immediately above the centre of Poupart's ligament. Laparotomy was performed by Ekehorn, and the tube was found in the ascending colon, the torn end being clearly seen through the intestinal wall. A longitudinal incision of three centimetres was made in the bowel, the tube extracted, and the incision sutured with fine-silk threads, two rows being placed through the muscular and serous coats and another row through the abdominal wall. An aseptic bandage was applied and the patient recovered from the operation without incident.

J. C. Hemmeter, of Baltimore, ¹Mar. 30, '96 describes an instrument devised by himself for use in stomach affections, by which water



APPARATUS FOR WASHING OUT THE STOMACH. (HEMMETER.)

New York Medical Journal.

runs into and out of the stomach continually through one and the same tube. The apparatus consists, first, of a large glass jar, A, having a stop-cock, F, near the bottom, graduated into divisions, each indicating one hundred cubic centimetres, and placed on an elevated platform, shelf, or the like. Secondly, of a double or return stomach-tube, which differs from the ordinary stomach- or lavage- tube of Ewald by the presence of a partition of soft rubber running through its entire length and seen in cross-section at L, really dividing the instrument into two canals, B and C. The canal for the inflow, B, connected at F with the faucet of the reservoir-bottle, is only half of the calibre of the outflow canal, C (this is not very apparent in the accompanying drawing),—a most important

provision to insure at all times a greater facility to the outflow than to the inflow; otherwise the stomach may become overloaded with water, which, owing to the elevated position of the reservoir, runs into the stomach very readily and in greater quantities than could be carried away by an outflow-tube of the same size as the inflow-tube. The connecting piece, *K*, with its four branches, *R R R R*, is made of hard rubber to prevent any stretching of the two tubes, *B* (inflow) and *C* (outflow), at *H*, the junction. The end



STOMACH-WASHING APPARATUS. (PITKIN.)

Buffalo Medical Journal.

of the return-tube has side-openings, *PP*, in addition to the openings at the lower end, which does not terminate abruptly, as in the sketch, but is beveled off smoothly and tapers, as shown at *M*.

John B. Pitkin, of Buffalo, ¹⁷⁰_{Oct., '96} instead of employing the ordinary stomach-tube with funnel attachment, resorts to a recurrent method of his own. Taking two small-sized semi-elastic pieces of white rubber tubing, one yard in length, he introduces them well back into the pharynx of the recumbent patient, who is requested to make frequent efforts to deglutate, intermitting with long inspirations, while the physician gently but persistently presses the tubes onward and downward until one-half of their length has

been swallowed. As a preparatory measure a 10-per-cent. solution of cocaine muriate, as spray or dropped in the nares, may be used to allay any reflex irritability of the parts. Having successfully inserted the stomach-tubes, a common Davidson or bulb syringe is attached to the distal end of one tube, and from one to three pints of very warm water (as hot as can be well borne by the hand) carefully and slowly injected. The syringe is then disconnected from the distal end of the tube and the latter placed in a proper receptacle, when the contents of the stomach will be siphoned out. Meantime more fluid can be injected through the second tube until the stomach-discharge consists only of the clear injected water.

Medicated air, introduced by the stomach-tube, is recommended by J. A. Storek, of New Orleans, ¹²July, '96 the drugs used being thymic acid, menthol, cinnamon, oil of cloves, and beech-wood creasote. He has used the method with some benefit in chronic mucous catarrh and dilatation. A. L. Benedict, of Buffalo, ⁴⁵¹Sept., '94 recommends the use of the menthol spray through the stomach-tube (1) in gastric fermentation due to yeasts or bacteria; (2) in painful affections, especially when the pain is griping and burning and due to fermentation; (3) in catarrhal inflammations, except the acute forms, in which all mechanical or irritating modes of treatment are emphatically contra-indicated. He uses an ordinary nickel-tipped atomizer and blows the vapor into the outer opening of the stomach-tube.

Rectal Alimentation.—Rectal alimentation may be exclusively employed for a long period, says Huchard, ³⁵Aug. 17, '95 without any serious injury to the nutrition of the patient. The same fact is demonstrated by C. Tournier, of Lyons, ³⁰⁴July 20, 27, '95 in a report of several cases in Lépine's clinic. The important point, according to H. G. Leisenring, of Wayne, ¹⁰⁶Sept., '95 for the practitioner to remember, is to begin with small enemata, 2 ounces every few hours, until the rectum retains this amount comfortably, when it can be increased.

Among simple measures that may be considered in relation to the treatment of gastric affections Dujardin-Beaumetz, of Paris, ⁶⁷Oct. 15, '94; ⁶⁷³Dec. regarded the position during sleep as one of the most important. A person affected with any disease of the stomach where there is true gastric stasis or a tendency to stasis should always lie on the right side, in order to facilitate the passage of the food from the stomach into the duodenum. If he lie upon the left side, as he frequently does unconsciously during sleep, there is an abundant discharge of gas, with regurgitation, the products of digestion being left in the œsophagus. While the epiglottis protects the respiratory passages perfectly during deglutition, it is absolutely powerless against food coming in the opposite direction;

so that particles which penetrate into the larynx may cause extremely painful attacks of suffocation. Hot water is also a simple, but useful, adjunct to the treatment of such affections, but often excites powerfully the muscular contractions; and as it often becomes distasteful, vomiting may occur, through its special action on the muscular fibre. Infusions of very hot liquids are therefore to be preferred. In patients with inactive stomachs, slow digestion, or dilatation of the ventricle, the author advises a small cup of very hot coffee one hour or an hour and a half after meals. Mathieu ²¹²_{Dec. 10, '94} also warmly praises hot drinks in rebellious cases. General articles bearing on the treatment of gastric affections, and worthy of mention, are those by J. F. Barbour, of Louisville ⁷¹_{Aug., '95}; J. M. G. Carter, of Chicago ⁷¹_{Apr., '95}; F. B. Turck, of Chicago ⁸⁰_{May, June, '95}; M. Soupault ¹⁰⁸_{Jan. 15, '95}; M. Vicente ¹⁰⁰_{Sept. 3, '95}; Faucher, of Vichy, ²¹²_{Apr. 25, '95} and G. Lemoine. ¹¹⁸⁰_{Feb. 1, '95}

Subphrenic Abscess.

R. Lampe, of Berlin, ³⁴_{May 14, '95} ¹⁵_{Aug.} in recording seven cases of subphrenic abscess, remarks that the etiology is varied, Maydl having ascribed not fewer than twelve different causes. Lampe's cases, however, lead him to the following conclusions: 1. Subphrenic abscess follows perforative ulceration of the stomach, either simple or malignant, especially when the posterior wall is involved. When following malignant disease, the abscess is usually on the right side, owing to the frequent affection of the pylorus; but if it is caused by a simple ulcer near the lesser curvature, the left side is more often involved. Ulcers of the greater curvature seldom give rise to a subphrenic abscess. 2. Appendicitis is a not infrequent cause, the abscess either spreading directly upward in the cellular tissue behind the peritoneum or arising secondarily from the bursting of an hepatic abscess, caused by venous thrombosis and septic absorption. Under the former circumstances it is usually located on the right side; but when due to the latter, either side may be affected. 3. Subcutaneous injuries are responsible for a certain number of subphrenic abscesses. Such are probably due to a localized extravasation of blood, which becomes infected with pyogenic organisms owing to the propinquity of the intestinal canal. 4. Diseases of the female genital organs, such as endometritis and pyosalpinx, may also lead to this condition, usually as a secondary result of an abscess in the liver. 5. Lastly, it may follow various suppurative affections of the thorax, such as empyema, pulmonary abscess, or suppurative pericarditis. The diaphragm is necessarily perforated in such cases, the aperture being found immediately beneath the pericardium or abscess-cavity in

the lung, whilst in an empyema the central portion of the diaphragm usually gives way. Four cases due to perityphlitic and one due to perinephritic inflammation are recorded by W. Sachs, of Mühlhausen. ²²⁶
B.50,H.1,'96

DISEASES OF THE LIVER.

General Considerations.

An important discussion took place before the French Congress for Internal Medicine at Bordeaux in August, 1895, upon the relation existing between the intestine and the liver in pathological conditions. V. Hanot, of Paris, ¹⁴
Aug. 18, '95 in a complete exposition of the pathology of the liver, drawn from his own experience and from the researches of his pupils, offered the following conclusions: Physiologically, intimate relations exist between the liver and the intestine, through the nerves and the circulation. The liver is one of the fundamental wheels of general nutrition, feeding all organic activity and defending against poisons,—in a word, it creates the bile and thus maintains the nutritive equilibrium of the intestine, neutralizing the poisons which reach it or form in it during its action, and also aiding in the special work of digestion. The physiological services rendered to the liver by the intestine are more restricted; it shares in its digestive and, possibly, in its antitoxic functions. The intestine appears to be the vestibule of all toxic and infectious agents,—alimentary poisons, such as alcohol; digestive poisons, such as acetic, lactic, or butyric acid; and microbes and their toxins. An injurious influence is exercised upon the liver by the intestine only when the condition of the former permits it, the intestine being entirely subordinate. It is from these relations between the two organs that the doctrine of intestinal antiseptis springs; and it will be easily understood that the term must not convey merely the idea of an action exercised directly on the intestine, but also of an indirect action on the liver. While the intestinal poisons are neutralized in the intestine itself, the antitoxic power of the liver must be maintained or strengthened, in order that it may contribute its part toward the destruction of the intestinal poisons, and, at the same time, defend itself from the poisons which enter it by other channels. In a word, intestinal antiseptis is not really efficacious unless it is hepato-intestinal. In the discussion of this paper Teissier described some experiments, made with Guinard, upon dogs, demonstrating that certain microbial toxins,—probably those with great diastasic power,—when introduced through the portal vein, acquired an increased virulence in the liver, and, although retained there for a

certain time, produced symptoms much more rapidly fatal than if the same toxins had been introduced in equal amounts into the peripheral venous system. Contrary to what has hitherto been supposed, therefore, the liver would appear to be capable, under certain circumstances, of aggravating the action of toxins, such as those of pneumonia and diphtheria, by increasing their virulence, and not by the addition of symptoms due to the destruction of the hepatic cells, in which no marked alterations could be observed in the experiments of the authors. This new function of the liver would explain the suddenness and gravity of certain intestinal affections, such as dysentery and cholera.

At the Sixth Italian Congress of Internal Medicine, Rome, the action of toxic products of intestinal putrefaction on the liver and kidneys was considered by Rovighi, of Bologna, ³_{Oct.30,'96} who gave the result of some experiments made by him on rabbits and guinea-pigs with indol, skatol, and phenol, with a view to determining the exactness of Hanot's assertion, that the toxic products resulting from the process of intestinal putrefaction, when absorbed in large quantity and for a certain period of time, may cause certain forms of hepatitis. This author found that indol and skatol produced analogous toxic effects in the organism,—viz., torpor, somnolence, generalized paresis, cardiac weakness, with lowered temperature and retention of the urine and fæces. The mortal dose for healthy adult rabbits is from 1.5 to 2 grammes (24 to 31 grains), injected under the skin within forty-eight hours; for guinea-pigs, about 1 gramme ($15\frac{1}{2}$ grains), injected in doses of 0.1 gramme ($1\frac{3}{4}$ grains) daily. After the first doses the animals become more susceptible to the poison, as though powerless to transform and eliminate it. Histological examination of the liver of animals dead from acute poisoning by indol or skatol shows marked congestion of the portal and hepatic veins; in chronic poisoning, especially by indol, there is an infiltration of the young cells around the biliary ducts and the intercellular spaces, while in the kidneys there is but a congestion of the vessels.

Icterus.

Etiology and Pathology.—Banti ⁶⁹_{Aug.1,'96} relates a case in which he considers that the infectious character of so-called simple jaundice was established. The patient, aged 22 years, had never had any illness until the ordinary symptoms of slight jaundice, lasting about two weeks, appeared. The liver was enlarged, as also the spleen. The stools were always colored with bile-pigment; so that there was no obstruction of the ducts. The temperature seems to have been raised and there was frequent nose-bleeding. While

the disease was at its height 3 cubic centimetres (46 minims) of blood were withdrawn from the spleen with a sterilized syringe, and under the usual precautions. The author obtained from this blood a capsulated micro-organism in pure culture, which did not stain by Gram's method, was pathogenic to white mice, and when injected into dogs, guinea-pigs, and rabbits displayed marked pyogenic properties. It was most closely allied to two forms of proteus and to the bacillus of rhinoscleroma. The author does not think that the presence of the micro-organism in the spleen could have been due to a secondary infection. Many of the symptoms presented by the patient were in favor of an infective process, and the micro-organism present was closely allied to pathogenic forms found in man. The fact that it did not produce jaundice in animals does not, in the author's opinion, invalidate his conclusions. Some micro-organisms have an hæmatolytic action. It does not follow that every case of simple jaundice is due to this micro-organism. The author would divide jaundice into the toxic and infective varieties, the latter having many causes. H. Jaeger, of Stuttgart, ⁶⁹_{Oct. 3, '95} apropos of Banti's paper, calls attention to the fact that he some time ago stated Weil's disease, or infectious icterus, to be due to a proteus infection, and he doubts whether Banti has really differentiated a new form of bacillus.

The influence of tuberculosis in the etiology of jaundice is illustrated by two cases: Ernest Knight, of Sheffield, ²_{Apr. 6, '95} relates a fatal case of jaundice in a boy 6 years old. A month after recovering from a slight attack of jaundice he came under observation again with intense icterus and a much enlarged liver. Toxic symptoms set in a month later, and in two or three days after this the liver began to diminish in size. The patient died four weeks after the onset of the second attack of jaundice. At the post-mortem examination, which was limited to the abdomen, a mass of tuberculous glands was found in the portal fissure compressing the hepatic duct. There was no sign of tuberculosis elsewhere. H. Köster ³⁷²_{p. 6, '94} ⁶⁷³_{Feb., '94} had under his care a boy, 3 years old, who suffered from repeated attacks of vomiting and jaundice of varying intensity from the age of 14 months. The appetite, previously good, was lost, and the child was greatly emaciated and complained of severe cramps in the lower extremities. The abdomen was much distended. The mother was phthisical. The condition of the child gradually grew worse; the temperature rose, dyspnœa supervened with vomiting every day, and he whined constantly. Inflammation of the right lung occurred, and the liver, which was exceedingly sensitive, increased in size. The icteric color of the skin gradually disappeared and the temperature fell to normal,

but marasmus developed, followed by death. Post-mortem examination showed tuberculosis of the lungs and spleen, some hypertrophy of the connective tissue of the liver, and considerable dilatation of the biliary ducts. A great number of tubercles as large as a pea, and many of them caseous, were disseminated throughout the liver. The portal hepatic glands were swollen to the size of a bean, and the mesenteric glands were also swollen. In the lowest part of the ductus choledochus a perforation of the wall, some few millimetres in diameter, led down to a cavity the size of a hazelnut, filled with a sticky, puriform mass, and surrounded by a fibrous and rather firm capsule of connective tissue.

The analogy between cases of Weil's disease due to the proteus and a case of icterus neonatorum seen by them in the child of a syphilitic mother is noted by Bar and Renon, of Paris.⁹²⁷
 The child was born apparently healthy, but fever appeared on the second day after birth, followed the next day by icterus, which rapidly increased in intensity, death occurring on the fifth day. At the autopsy a large liver, containing numerous gummata in an early state, was found. Cultures from the liver, spleen, and heart's blood gave a single organism corresponding in every way to the proteus vulgaris. Sections of the liver showed the intra-cellular spaces to be crowded with the same organism. The authors consider the icterus, judging by the course of the disease, to be due to the infection, and not to the syphilis.

O. Lasch⁴_{Oct. 1, '94} publishes three cases of icterus coming on at an early period of syphilis, and adds a table of forty-six additional cases, mostly collected from French literature, with a view of establishing the differential diagnosis between simple catarrhal and syphilitic icterus. The latter usually comes on suddenly, without being preceded by the digestive disturbances which are the prelude of the catarrhal form; in some cases the digestion remains excellent throughout, though, as in catarrhal jaundice, there is a distaste for fats. Another point to be noted is the absence of any etiological factor except syphilis. The jaundice usually appears with the first eruption, and is most frequent in females.

Roque and Devic, of Lyons,¹⁴_{Nov. 11, '94} observed a fatal case of icterus in the secondary stage of syphilis, the entire liver being found at necropsy to be invaded by gummatous hepatitis. The cause of localization in the liver is attributed by the authors to an attack of emotional icterus thirteen years previously, which had left lesions of the liver.

Israel Hedenius³⁷²_{V. 29, Nov. 7, 8; Mar., '95}⁶⁷³ recommends the following as a simple method of detecting bile-pigment in icteric fluids: To about 5 cubic centimetres ($1\frac{1}{4}$ fluidrachms) of serous fluid add twice or

three times its volume of concentrated alcohol and shake the mixture. Add as many drops of hydrochloric acid (10 to 25 per cent.) as will be required to dissolve the precipitation caused by the addition of the concentrated spirits, when the fluid will become clear. Bring the fluid to a boil, and if gall-pigment be present a blue-green color will appear within a minute or so. In a serous exudation containing only 1 part of bilirubin to 250,000 parts of fluid, the blue-green color became very conspicuous. When it is desired to ascertain the presence of an insignificant quantity of the coloring matter of the bile in concentrated fluids rich in albumin, the author proceeds as follows: To 3 or 4 cubic centimetres ($\frac{3}{4}$ to 1 fluidrachm) of the fluid add four or five times its volume of concentrated spirit, which will cause the precipitation of all the proteid substances present. Shake well several times and filter the fluid. Add several drops of hydrochloric acid and boil, when, if gall-pigment be present, a delicate blue-green color will appear.

To test the blood precipitate 2 to 4 cubic centimetres ($\frac{1}{2}$ to 1 fluidrachm) with the aid of 10 to 20 cubic centimetres ($2\frac{1}{2}$ to 5 fluidrachms) of concentrated spirits and shake well several times. To 10 cubic centimetres ($2\frac{1}{2}$ fluidrachms) of the percolated fluid add about 5 drops of hydrochloric acid (preferably 10-per-cent. strength) and boil. The blood must be fresh, and frozen blood should not be used. In order to make the reaction perfectly plain the blood must contain not less than 1 to 50,000 bile-pigment. As to the urine, it is important that this be diluted with at least four volumes of concentrated spirits.

Auché and Coyne, of Bordeaux, ³Aug. 14, '96 observed a case confirming the assertion of Hanot that there was a form of serious hypothermic icterus due to the bacterium coli. The patient was a child 10 years of age, a deaf-mute, who died from typical icterus supervening without apparent cause, and not accompanied by fever. At the autopsy the lesions of acute yellow atrophy of the liver were revealed with cholecystitis and angiocholitis, involving even the smallest extra-lobular canaliculi. The coli bacillus was present in large numbers in the bile-ducts, and some few in the spleen. The authors believe the case to have been one of primary angiocholitis, caused by the coli bacillus, which, leaving the duodenum, gradually invaded the biliary canaliculi, reaching the hepatic parenchyma and causing acute atrophy and symptoms of icterus.

Hanot ¹⁶⁴Nov. 8, '94 having had occasion to observe a case of grave icterus with hyperthermia in which the staphylococcus albus, but not the coli bacillus, was present, is led to believe that the latter gives rise to icterus without fever and the former to icterus with fever.

Acute Yellow Atrophy.

From five cases of acute yellow atrophy observed by Marchand within the past twelve years, E. Meder ⁷⁶⁸_{B.16,p.148,'96} draws some interesting conclusions on the regenerative processes which take place during the course of the disease. After referring to the cases described by V. Babes ²⁰_{B.136,p.1} and others, in which infection by pyogenic cocci appeared to have played a part in producing the condition, the author enunciates the proposition that, as in phosphorous poisoning, the essential anatomical change in acute atrophy is a fatty degeneration and necrosis of liver-cells. Some of the epithelial cells of the bile-ducts share in this necrosis. The icterus is due not to hæmatolysis, but is a true jaundice due to absorption of bile, the smaller bile-ducts being destroyed; so that the bile cannot escape by the normal channels, but is absorbed by the veins and lymphatics. The processes of regeneration observable in many cases of acute atrophy of the liver are minutely described; and to Meder's account of these phenomena Marchand himself ⁷⁶⁸_{B.16,p.206} ¹⁵_{Aug.} adds a careful description of the formation of minute canals resembling bile-canalliculi by the subdivision of epithelial cells which have escaped destruction. In brief, the process known as acute atrophy is accompanied by reparative processes when the disease is not so rapid that death takes place before there is time for cell-proliferation to occur. The morbid anatomy of acute atrophy does not throw much light on the essential nature of the disease. Many authors have noticed the coincidence of the disease with secondary syphilis. It has often been noticed as occurring during pregnancy, and in other conditions which suggest the possibility of syphilis having been present; but it has also been noticed independently of syphilis,—for instance, in association with erysipelas, diphtheria, acute gastritis, etc. Thus, whilst there is little doubt that the disease is due to an acute living virus, the nature of the virus is unknown; and Marchand believes it possible that acute atrophy of the liver is produced by several different infections, of which syphilis may be one. In a case seen by Huber, of Berlin, ¹¹⁵³_{June 19,'95} syphilis was ascertained post-mortem to be the principal factor. Cases of acute yellow atrophy are recorded by C. H. G. Ramsbottom, of Manchester ⁶_{Mar.9,'95}; C. E. V. Kennon, of Providence, R. I. ⁵⁹_{Feb.2,'95}; D. J. Collins, of Devonport, ⁶_{Aug.24,'95} and H. B. Donkin, of London ⁶_{Jan.5,'95}; all fatal.

Cirrhosis.

Etiology and Pathology.—Kabanoff, of Moscow, ³⁶⁰_{Feb.,Mar.,'95} discusses in detail the etiology of fourteen cases of cirrhosis which he was able to follow closely, and in ten of which alcohol had

been used, though in only five to excess. Other causes may be combined with alcoholism to produce the disease, such as syphilis, malaria, rheumatism, damp dwellings, etc. To thoroughly explain the etiology, however, another factor is necessary, and this factor is the predisposition of the organ or the organism. An hereditary predisposition was present in ten of his cases, depending upon marked inebriety or other disturbance in his antecedents. Cirrhotic patients are usually degenerate by heredity or acquired taint.

E. Boix, of Paris, ²⁰²⁶₉₆ insists on the rôle of gastro-intestinal fermentation in the production of cirrhosis, and states that, in many cases supposed to be alcoholic, dyspepsia will be found to be an important factor. Hanot maintains that the hypertrophic cirrhosis with chronic icterus is of infectious nature, and as a further proof he brings forward, with Meunier, ⁹²⁷_{Jan. 26, '96} evidence of the presence of leucocytosis in the affection. In five cases examined a number of times an excess of leucocytes was always found, and there was no extra-hepatic inflammation to account for it. The normal number—six thousand—is not exceeded in alcoholic, atrophic, or hypertrophic cirrhosis.

Gilbert and Fournier ¹¹⁸_{July, '96}; ²_{July 27} report seven cases of biliary cirrhosis in children and presenting all the symptoms observed in the adult, but with the addition, in many cases, of hypertrophy of the spleen. So conspicuous was this feature that in those cases in which the liver is not very much enlarged—and such enlargement is often not great in children—the true nature of the disorder may be easily mistaken. They believe this enlargement of the spleen, in association with biliary cirrhosis, to be peculiar to cases commencing in childhood. A further peculiarity of the disease, as observed in children, is the frequency with which clubbing of the fingers may be observed. In some instances the ends of the femur and tibia were enlarged also. Evidence of the influence of the disease on the general nutrition is to be detected also in the retarded growth and the backward appearance of the sufferers.

Jogendro Nath Ghose, in discussing before the Indian Medical Congress the frequency of biliary cirrhosis among the children of certain classes in Calcutta and Bengal, ⁶_{Jan. 5, '96} stated that the disease, insidious in its onset, usually prevails among infants under the age of 1 year and seldom attacks children after the third year. The attack generally commences about the seventh or eighth month, chiefly at the period of dentition or at the mother's next conception. The children of some parents are particularly liable to the disease. In one family he has observed fourteen children of the same parents die one after the other. It spares neither the rich nor the poor, though the well-fed children of the wealthy and

the middle classes are much more liable to it than the ill-fed children of the poorer classes. Mohammedan and Eurasian children suffer less than Hindoos. Hardly any cases are seen among Europeans. The main causes of the disease are, in Ghose's opinion, unwholesome food and faulty digestion. E. Mackenzie, ⁶_{Feb. 2, '95} in twenty-six years' experience in North Canara, a tract of country on the southwest coast of the Bombay Presidency, has had quite extensive opportunity for seeing and verifying, by post-mortem examination, this fatal form of cirrhosis in children; and he regards it as strange that it should be peculiar to the Brahmin children. A single instance was not found in a Sudra, Christian, or Mussulman, although all lived very much alike, partaking of very much the same kind of food, as rice, fish, pulse, vegetables, and condiments, excepting for a few sects of Brahmins (who formed only a fraction of the bulk of the population), who did not use fish. Brahmin women in childbed adopt a diet which may conduce to the disease in the newborn infant, in whom it has been seen. They restrict themselves to the use of a strong decoction of black pepper to allay thirst, abstaining from liquid of any other kind, and as food use balls made up of boiled rice, *ghee*, and coarse sugar. Is it possible that the pepper here, acting through the mother's milk, might start irritation in the infant liver? Canara is a malarial district,—heat, vegetation, and moisture tend to make it so in a pre-eminent degree; but the disease is as common on the sea-coast as it is in the interior, where one would suppose malarial influences would be greater.

O'Carroll ¹⁶_{Aug., '95} showed to the Royal Academy of Medicine in Ireland, a cirrhotic liver taken from a child of 8 years. The specimen was remarkable by reason of the fact that from the under surface protruded downward a large mass consisting of nut-like islands of hepatic tissue surrounded by thick bands of glistening fibrous tissue, and which during life had given rise to the suspicion of a tumor of the liver or in its neighborhood. No previous history of the patient could be obtained sufficient to settle the question of causation, but the large amount of perihepatitis seemed to hint at a syphilitic origin of the disease,—a theory favored by most of the members present. That the affection can no longer be considered rare in children is attested by the numerous cases recorded during the year. Among the most important of these might be mentioned the case presented by Foxwell to the Midland Medical Society, ²_{Mar. 15, '95} a boy of 3 years with a large liver of very dense consistence, which was considered to be cirrhotic owing to alcohol, with which he had been regularly dosed by his parents,—spirits as well as beer; the case recorded by P. Weber, of Lon-

don, ²_{Apr. 16, '95} a girl aged 14, whose liver weighed $26\frac{1}{2}$ ounces post-mortem; those recorded by Abbe, of New York ⁹⁶_{Oct., '95}; W. C. Smith, of Selma, Ind. ⁵⁶_{June, '95}; W. A. Edwards, of San Diego, and W. M. Gray, of Washington, ⁵¹_{July, '95} and M. Gesselewitsch. ⁸⁵⁹_{Nos. 4-6, '95}

Sieveking, ⁸⁵⁴_{Dec. 31, '94} and ²_{Feb. 9, '95} in a microscopical examination of twenty well-marked cases of atrophic cirrhosis, chiefly alcoholic, found that the proliferated connective tissue infiltrated the liver-substance in quite an irregular manner. In some parts the newly-developed connective tissue was inter-acinous, in other parts intra-acinous. The tracts of connective tissue were sometimes broad, sometimes narrow. In some parts a lobule was divided, by tracts of connective tissue, into larger or smaller groups of liver-cells; in other parts, fine fibres of connective tissue surrounded each liver-cell. The variations were so numerous that no particular type of connective-tissue proliferation could be recognized. In no place did the liver-cells show signs of atrophy or degeneration unless surrounded by tracts of connective tissue. The fine fibres of connective tissue ended freely between the normal liver-cells; only when the connective tissue encircled separate cells or small groups of cells did atrophy occur; hence the author regards the proliferation of connective tissue as the primary change. In the spleen, the capsule, the trabeculæ, and the sheaths of the vessels were thickened; in various parts the pulp net-work was widened and lymphoid elements clustered in the same and around the vessels. These changes the author regards as the result of congestion. No proliferation of connective tissue could be detected, neither by this author nor by Hohenemser, ²⁰_{B. 140, H. 1, '95} who, from his histological researches, is led to conclude that the elastic tissue takes an active part in the hepatic cirrhotic process. His examinations were made on 25 livers,—18 of common atrophic cirrhosis, 3 of hypertrophic, and 4 syphilitic.

Faber ³⁷³_{p. 1027, '94} ⁶⁷³_{Apr., '95} observed the case of a man, 41 years of age, who, after cleaning a foul drain, was attacked with hypertrophic cirrhosis of the liver. The symptoms were fever of the remittent type, loss of force, and pain in the right hypochondriac region. The liver was enlarged and reached five or six centimetres below the costal curvature. After some time the motions became fetid and clayey. The temperature rose during the attacks of fever to 40° C. (104° F.), and fell during the remission to 36° C. (96.8° F.), and once even to 34.9° C. (94.8° F.). Coma ensued, followed by death. At the autopsy the liver, which weighed 2000 grammes (64 ounces), showed a large new growth of connective tissue and round cells in the vicinity of the portal vein and the gall-ducts, while the central veins were quite normal. The cells of the liver

were healthy, without fatty degeneration. No micro-organism could be detected in the bile.

Vincent Griffon, of Paris, ⁷_{Oct., '94} describes a case of alcoholic cirrhosis in which the disease was of the atrophic form in the right lobe and of the hypertrophic form in the left lobe. In a case described by Hanot, of Paris, ¹⁴_{June 15, '95}; ¹²¹_{Aug.} the disease terminated very rapidly from hæmorrhages from the stomach. The attacks of hæmatemesis were peculiar in that they consisted sometimes of red and sometimes of black blood. In the first case the vomited matters had a neutral or alkaline reaction and in the second they were alkaline. These differences of aspect and reaction were occasioned by the length of time the blood had remained in the stomach. The cause of the hæmatemesis was rupture of an œsophageal varix which co-existed with the alcoholic cirrhosis. In addition to these lesions there was found a chronic generalized peritonitis, with thickening of the parietal layer of the peritoneum and milky patches similar to those which occur in pericarditis. A similar case is recorded by Thomas, of Geneva, ¹⁹⁷_{Apr. 20, '96}.

Hanot ¹⁴_{Feb. 24, '96} has met with two patients with alcoholic atrophic cirrhosis, complicated by numerous lymphatic varices of the abdominal wall. The swollen vessels ran, for the most part, transversely, but vertical branches extended, especially upon the left side, as high as the umbilicus. A quantity of their contents was withdrawn and examined. The fluid was clear, limpid, and contained lymph-corpuscles. Hanot can offer no explanation of the condition, which he considers a rare one.

F. L. Benham, of London, ²_{June 1, '96} reports a case of cirrhosis with extreme thickening and contraction of the mesentery simulating a tumor. The enormously shrunken mesentery was shortened, thickened, and loaded with fat, the small intestines being huddled up compactly together. The omentum was thickened and condensed into the shape of a sausage. The condition was evidently that of one form of chronic peritonitis, but one which had not been described, as far as the author knows, in connection with cirrhosis of the liver, though a slight degree of the affection—namely, condensation of the omentum—is not uncommonly met with post-mortem in cases of this disease.

Cancer grafted upon cirrhosis of the liver has been found post-mortem by Frerichs, Paul, and Brissaud; recently, Galvagni ¹¹⁶⁷_{No. 4, '96} has added a case and Testi ⁵⁸⁹_{Nos. 60, 62, '95} three cases. The last-named author, who says he was the first to make the clinical diagnosis, in 1878, states that all his patients showed the usual physical and functional signs of cancer of the liver, with the etiological proof of cirrhosis, such as alcoholism or malaria, and

symptoms rare in cancer, but frequent in cirrhosis, as ascites without peritonitis, icterus, and especially splenomegalia. The diagnosis was confirmed at the autopsy of one of these patients, the liver being found sclerosed, with numerous carcinomatous nuclei. Histological examination showed that the cirrhosis had preceded the cancer, the entire liver being composed of a sclerotic tissue, invaded at isolated points by carcinomatous nodules starting from the biliary ducts.

The presence of pleuritic effusion on the right side only, in Laennec's atrophic cirrhosis, has been noted as rather an exceptional symptom; G. Villani, however, ⁵⁸⁹Mar.9,'95 is inclined to regard it as a constant symptom, having found it in nine cases of cirrhosis examined in Capazzi's clinic, and of value in the diagnosis of doubtful cases, in which it is difficult to determine whether ascites is due to cirrhosis of the liver, to thrombosis of the portal vein, or to compression of that vessel by tumors or swollen glands. In the latter conditions perihepatitis does not exist, while in atrophic cirrhosis its presence explains the pleurisy by propagation to the right pleura. A. R. Edwards, of Chicago, ⁶¹June 15,'95 suggests the following classification, less as an arbitrary or infallible scheme than as an attempted tentative reconciliation of conflicting clinical and pathological data awaiting stricter future analysis:—

Cirrhosis hepatitis.	I. Capsular.	<ul style="list-style-type: none"> a. Chronic perihepatitis. b. Portal-vein syphilis.
	II. Vascular.	<ul style="list-style-type: none"> a. Hepatic vein. <ul style="list-style-type: none"> 1. Stasis cirrhosis (cyanotic induration). 2. Cirrhosis (in Laennec's cirrhosis also, Brieger and Sabourin). b. Portal vein. <ul style="list-style-type: none"> 1. Laennec's cirrhosis or atrophic cirrhosis. 2. Hypertrophic alcoholic only remaining large.
	III. Biliary.	<ul style="list-style-type: none"> a. Obstruction—"Retentions-icterus" and cirrhosis. b. Biliary or hypertrophic, in French sense. Hanot's cirrhosis.
	IV. Mixed.	(Vascular and biliary cirrhosis.)

Treatment.—Lauenstein, of Hamburg, ⁶⁹No.19,'95 observed two cases of cirrhosis of the liver which were apparently checked by tapping. One case had a clear history of abuse of alcohol, and in the other this was probable. In both the liver was enlarged. In the first case, after six tapplings, the fluid did not re-accumulate during the two and a half years which had elapsed at the time the report was made. The patient had continued to use wine and beer, and had passed through an attack of delirium tremens. The liver became smaller. The spleen was not enlarged at any time. In the second case tapping was performed three times, after which the patient remained apparently well for several years. The liver became smaller. The spleen was large in the beginning and remained so.

Abscess.

An interesting case is recorded by L. Longuet, of Paris, ^{1153 15}_{Mar. 16; Aug., '96}—a patient, aged 41, who suffered from a slowly-developed abscess of the liver, which recurred twice after it had been first opened, and needed three laparotomies for its cure. On the last occasion $4\frac{1}{2}$ litres (quarts) of pus were evacuated, of a somewhat thick consistency and of a chocolate color, mixed with yellowish-white curds. The cavity, which was not limited by any definite pyogenic membrane, was washed out and drained with an iodoform-gauze tampon. A perfect recovery followed the last operation in the course of six or eight weeks. Several points of interest are commented on, the most important being as follows: The abscess arose without any assignable cause; there was no history of diarrhoea, dysentery, piles, or traumatism. The condition relapsed twice, in spite of apparently successful operations,—a most unusual occurrence in hepatic suppuration. The volume of the abscess was very great. Dutrouleau and Rendu estimate the size of a large hepatic abscess as containing 400 or 500 grammes (13 or 16 ounces) of pus. There are not many cases on record in which a larger amount of pus was found. Lastly, the pus was absolutely sterile, no organisms being found on microscopical examination, and no growth taking place on test-tube cultivations.

The sterility of the pus in certain abscesses of the liver is now well recognized. It was first pointed out by Bokai in 1881, and since that time Longuet has collected thirty-eight observations of a similar nature. It is more likely to be sterile in those abscesses which arise spontaneously than in those secondary to ulceration of the bowel. The absence of organisms is an important element from the stand-point of prognosis, since it suggests the possibility of rupture of the abscess into the peritoneal cavity without fatal results; and, indeed, cases have occurred where it has been sufficient merely to wash out the pus in order to insure a cure. The suggestion that the organisms have been killed by the action of the bile is a mistake, the author thinks, since it has been shown that the bile is an excellent medium for the cultivation of certain forms of bacteria. Again, the supposition that hepatic suppuration is due to germs which cannot be demonstrated by any of the ordinary methods of examination is entirely hypothetical, as is also the theory that the active elements consisted of amœbæ or other low forms of life connected with the primary dysenteric symptoms. By far the most likely theory is that the sterility is developed secondarily by the gradual disappearance of the microbes, owing to some chemical action of the liver-cells, of which we understand nothing at present. This explains in a measure the observations that have

been made in which staphylococci were discovered microscopically ; but the results of cultivation experiments were entirely negative, the organisms, though present, apparently not retaining sufficient vitality to develop in nutrient media. This theory, too, agrees with the fact that in all but one of the cases in which sterile pus was found in an hepatic abscess the onset of the symptoms was gradual, and not acute ; and even in this exception there is no knowing when the suppuration actually commenced.

Two cases observed by Boinet³_{Nov. 3, '94} show that the abscesses were consecutive to tropical dysentery, and the pus from both gave pure cultures of staphylococci. An experience of about forty cases of tropical abscess of the liver leads Neil Macleod, of Shanghai, China,⁶_{Oct. 26, '95} to regard it as rarely a primary affection of the liver, and to believe that its relationship with dysentery is not one of coincidence merely. In all but one of these cases post-mortem signs of dysentery were found, the exceptional case recovering. Abscess is, to his mind, undoubtedly an unknown result of liver congestion and inflammation in Great Britain, and he has never seen an abscess in tropical regions that could be attributed to congestion independently of dysentery. He has never seen a case of primary hepatitis pass on to suppuration. Singapore cannot be regarded as free from hepatitis by any means, but it is singularly free from liver-abscess and dysentery. The West Indies are not singularly free from hepatitis, but hepatic abscess is rarely met with there. Of some one hundred and seventy-five cases studied by him from literature, he can adduce no convincing proofs of the primary nature of the affection. An interesting case of hepatic abscess secondary to duodenal ulceration caused by extensive burns is recorded by P. Hehir, of Hyderabad.²³⁹_{June 16, '95} The clinical phenomena corresponded exactly with what would be expected in such a case. The pus from the abscess contained only small ordinary micrococci.

Widal and Griffon, of Paris,⁷_{Jan., Feb., '95} report a case demonstrating the biliary origin of certain areolar abscesses of the liver. The patient was a woman, 73 years of age, suffering from biliary lithiasis without icterus. Post-mortem a large calculus was found in the contracted biliary vesicle and another in the ampulla of Vater, while in the right lobe of the liver there was a typical areolar abscess. Microscopical examination of the hepatic parenchyma showed the ramifications of the portal and subhepatic veins to be intact, and inflammatory alterations in the biliary ducts, the epithelium of which had desquamated and formed granular detritus in the cavity of the canals. The entire portal space was filled by embryonic cells. The coli bacillus was found in the pus

of the abscess. Some thirty-four gall-stones were passed through an hepatic abscess opening externally in a patient treated by G. Covert, of Clinton, Wis. ¹⁹²_{Aug., '96}

Tschernow, of Kiew, ⁵⁸⁶_{Nos. 35, 39, '94} in discussing three cases of suppurative hepatitis in children, occurring in his practice, comments on the infrequency of the affection in early life and on the similarity of the symptoms to those in the adult. The disease may be absolutely latent and insidious. Adults with hepatic abscess may be able to perform any kind of work, and the author has seen cases in children where the disease entirely escaped recognition or was mistaken for some other affection. Thus, in one instance the diagnosis was only made when peritonitis consecutive to opening of the abscess set in. In another case ordinary tuberculosis was the diagnosis until the child died suddenly; no little astonishment was caused when an abscess of the liver was discovered. In Tschernow's third case the patient was supposed to be suffering from typhoid fever; only the autopsy revealed the true cause of the fever and other general symptoms. The diagnosis may thus be very difficult. The exaggerated convexity of the right hypochondrium, the dilatation of the base of the thorax at the right side, and the accompanying œdema of the hepatic region must be borne in mind and may suffice for the diagnosis if they are associated with the febrile phenomena that occur during the development of all purulent foci. A special characteristic, however, of hepatic abscess, and particularly in the case of children, is that there may be, though only in rare instances, no local pain. Too much importance, therefore, must not be attributed to the absence of pain. When the abscess has attained a certain size the increased convexity of the dome of the diaphragm on the right side and the diminished amplitude of the movements of the liver during respiration may become apparent, but these and other symptoms may be modified by the complication of a right pleurisy. Care must especially be taken not to mistake the affection for pleurisy. The facility with which such an error may be made is illustrated by a case described by Hanot, ⁶⁷³_{Mar., '96} that of a woman, aged 45 years, admitted into hospital for purulent pleurisy. Three successive incisions were made in the eighth right intercostal space, the first two punctures being followed by the escape of about 300 grammes (9½ fluidounces) of fetid pus. Relief not being experienced, the ninth rib was resected for about three centimetres, the pus-sac incised, and a couple of drains placed in the wound. The cavity was washed out, but the temperature remained high and the patient finally died. A post-mortem examination showed the right lung pushed upward and in a condition of atelectasis, from

the pressure of an encysted serous effusion containing some 700 grammes (22½ fluidounces). The right lobe of the liver was like an immense sponge filled with pus, each little pocket being separated from its neighbor by but slightly-altered hepatic tissue. An abscess the size of a nut occupied the left lobe of the liver. The pus was examined bacteriologically and a few chains of streptococci were found among the white cells. Inoculation experiments showed these microbes to be absolutely sterile. Hanot expresses the opinion that in a similar case, if examination of the pus showed it to be sterile, a diagnosis of abscess of the liver, rather than of purulent pleurisy, should be made. A case in which abscess of the liver simulated ulcer of the stomach is recorded by Texier, of Bordeaux, ¹⁴ June 2, '95 the condition being ascertained only at autopsy.

P. S. Blaker, of Dum-Dum, India, ²³⁹ Nov. 1, '94 reports a case of hepatic abscess in which there were unmistakable symptoms of peritonitis, caused, in all probability, by the accumulation of gases from non-action of the bowels, which, in turn, was due to the absence of bile from the alimentary canal. At the necropsy the liver was found to contain nine abscess-cavities of various sizes, none of which had ruptured. In a case seen by E. N. Nason, of Nuneaton, ³² Apr., '95 the whole surface of the liver was found studded with small abscesses, the largest containing about a drachm of greenish pus. They were evidently of pyæmic origin from acute general peritonitis with intense perihepatitis and perisplenitis.

Monnier, of Nantes, ¹⁴ Sept. 4, '95 describes the case of a man, aged 41 years, of alcoholic habits, and whose only illness had been an attack of influenza in 1888. There were two distinct phases in the symptomatology of the case. During the first months following his admission to the hospital, in March, 1893, there were only gastro-intestinal symptoms; from August on signs of diaphragmatic pleurisy were noted. Death occurred on the 20th of September, and at the necropsy about 300 grammes (9½ ounces) of ascitic fluid were found in the peritoneum, which was dotted with tuberculous granulations involving the large intestine, the loops of which were agglutinated. Between the mass formed by the upper part of the jejunum and the liver was a pocket filled with pus, and another between the diaphragm and the median line of the upper edge of the liver. Section showed three distinct abscesses of the liver, and microscopical examination showed the tuberculous nature of the angiocholitis. The author regarded the case as the only one of tuberculous pyoperihepatitis in the adult recorded in medical literature. B. Reverseau ²⁰⁰⁰ Mar. 6, '95 gives a complete study of this subject. A case in which tubercle bacilli were found in the pus from a superficial liver-abscess is recorded by Churton, of Leeds. ⁶ Mar. 9, '95

Hydatid Cyst.

Thos. Fiaschi, of Sydney, ²⁶⁷_{Aug.20,'96} considers Santini's resounding or booming sign, alluded to in last year's ANNUAL (v. i, C-63), as a valuable addition to the semeiology of hydatid disease. A further practical application of the test, not mentioned by Santini, is the diagnosis of single from multiple cysts, the sound being uniform in a single cyst, no matter on what part of the tumor percussion is made, while in multiple cyst there is a variation of the hydatid resonance dependent upon the number of cysts and the point percussed. Hydatid cysts opening through the gall-bladder are recorded by N. Brjuchanow ⁸⁵⁹_{No.2,'95} and W. Medwedjewa, ⁸⁵⁹_{No.2,'95} and one perforating into the urinary bladder by A. Henczynski. ³⁴_{Mar.26,'95}

An instance of infection of an hydatid cyst by the pneumococcus is recorded by Galliard, of Paris. ¹⁴_{Apr.21,'95} The man entered his service with symptoms pointing to intestinal obstruction. These symptoms soon passed off, but the liver remained large. An exploratory puncture yielded pus without admixture of bile, and pneumococci, without other organisms, were found in the pus. The cyst, which was produced by hydatids, was incised, and the patient recovered.

Burci ⁵⁵_{Aug.17,'95} had under his care a man who had shown symptoms of hydatid cyst for three years, when he was attacked by typhoid fever. During convalescence the liver became enlarged and showed signs of abscess. Incision gave exit to pus containing the bacilli of Eberth and echinococci. A second incision was made and the liver diminished in size. Soon after an abundant, glairy diarrhœa supervened, and the pus from the abscess showed not the bacillus of Eberth, but the bacterium coli. The author believes that there were here two successive infections by the two bacilli,—a point of interest to those who question the identity of the two micro-organisms.

Tumors.

Cancer.—E. Flu ²¹²_{Aug.16,'95} recalls the importance of Hanot's assertion, that certain cases of hepatic cancer resemble nothing more closely than the terminal stages of heart disease. In cancer there is absolute anorexia, pigmentary acholia, rapid and progressive hypertrophy of the liver, great and persistent diminution of urea, absence of albuminuria, increased urinary toxicity, and decreased red corpuscles, hæmoglobin, and leucocytosis. In cardiac disease, on the other hand, urea is diminished, but not to the same extent as in cancer, and treatment of the heart trouble may cause considerable azoturic excretion; albuminuria is the rule; the red blood-cells rarely fall below 2,500,000, the hæmoglobin is normal, and

the number of leucocytes is not increased. Consideration of all these points and the history will permit of a correct diagnosis.

Two rare cases of carcinoma of the liver with cirrhosis are recorded by M. H. Fussell and A. O. J. Kelly, of Philadelphia, ¹¹² Aug., '95 with details of the autopsies. The first was remarkable for the uniform and universal conversion of the liver-substance into cancer-tissue. It was a typical picture of trabecular epithelioma accompanied by cirrhosis, differing from other specimens reported by the uniformity of invasion, the appearance being that of a massive cancer, without any traces of the tumors of various sizes usually present and seen in the second case, which was apparently an earlier stage of the process.

Gilbert and Claude ³⁶⁰ May, '95 record a case of carcinoma of the liver in which the anomalous clinical course caused difficulties of diagnosis. There were many reasons against growth. Fragments of the growth had probably become detached and, escaping into the bile-channels, had produced the symptoms of biliary colic. The obstruction of the channels caused the jaundice. The glands in the hilum of the liver were enlarged, and pressing on the vessels had caused the circulatory disturbances. There was some degree of cirrhosis of the liver consecutive, in the authors' opinion, to the carcinoma. A case in which the cancer was only recognized at autopsy, owing to the absence of all the usual symptoms, is related by E. Dupont. ⁴⁵⁴ Sept., '95 Slight glycosuria was noted in a case seen by Sacaze. ³⁶³ Jan. 19, '95 There was also urobilinuria, diminished urea, and increased toxicity of urine. Bonnevie ³⁶⁹ p. 127, '95 observed a case in which cancer of the liver developed with excessive rapidity. The patient was previously a healthy man, aged 37 years, who, in November, 1893, began to suffer from gastric trouble. In January, 1894, pain appeared in the right hypochondrium, and hypertrophy of the liver became apparent and increased steadily. The patient died in February, 1894, and post-mortem examination showed colossal carcinomatous degeneration of the liver.

Sarcoma.—Codd, of Birmingham, ³² June, '95 describes a case of melanotic sarcoma of the liver in which, post-mortem, the liver weighed 13 $\frac{3}{4}$ pounds (6.2 kilogrammes) and contained about six large masses, readily fluctuating and containing a gray, semisolid material. Several small growths also were seen, from the size of a pea upward, some black, others white, the former all showing a tendency to break down. Growths were also found in the heart, pancreas, right kidney, and right lung, the one in the heart involving the whole thickness of the right ventricular wall and softening. Subsequent inquiry showed that the left eye had been removed in 1890, for growth.

Holsti ⁴⁹⁸_{Jan., '95} reports an almost similar case in which microscopically it was found that the normal liver-structure had almost entirely disappeared. There was a large number of round and oval cells of variable size, filled with dark pigment, which was also detected in the tissues outside the cells in the form of granules. There were similar growths scattered over the peritoneum, omentum, and heart-muscle immediately under the endocardium. As there were no symptoms or history of any primary mischief in the skin or choroid, the author thinks there is sufficient ground for presuming that it was a case of primary melanotic sarcoma of the liver, although he does not know of any similar case having been previously recorded.

Miscellaneous Growths.

Among interesting cases of tumors of the liver may be noted one of adenocarcinoma with cirrhosis, by Siegenbeck Van Heukelom ⁷⁶⁸_{B.16,p.342}; adenoma, R. Witwitzky ⁵⁸⁶_{Nos.23,25,'95}; primary encephaloma, H. W. Chapman, of White Hall, Ill. ³⁶⁴_{Dec., '94}; scirrhus-encephaloid, Dugald Mitchell, of Renton ²¹³_{June, '95}; cylinder-celled epithelioma with cysts, C. O. Hawthorne, of Glasgow. ²¹³_{Apr., '95}

Pylephlebitis.—Boinet, of Marseilles, ¹⁴_{Aug.18,'95} claims that the presence of peptones in the urine and in ascitic fluid is a sign of adhesive pylephlebitis. He bases this claim upon a case of atrophic cirrhosis occurring in his practice in which there were 6 grammes ($1\frac{1}{2}$ drachms) of albumin and 0.30 gramme ($4\frac{1}{2}$ grains) of peptone per litre (quart) in the ascitic fluid and 0.15 gramme ($2\frac{1}{4}$ grains) of peptone in the urine. Toward the end there was tumefaction of the spleen, paresis of the lower limbs, great dyspnoea, somnolence,—in fact, all the symptoms observed in experimental ligation of the portal vein. At the autopsy this vein was found thickened and obstructed by an adherent fibrinous clot, and its ramifications were surrounded by sclerotic patches. The liver was but slightly contracted.

Sidney Phillips, of London, ²_{June1,'95} relates a case of suppurative pylephlebitis with abscess in the spleen and a foreign body in the mesenteric vein, in a man, aged 52 years, who had had rheumatic fever at the age of 17, had suffered from asthma, and had been a free spirit-drinker. The cause of the general suppurative pylephlebitis was, in all probability, two bristles found, at the necropsy, in the inferior mesenteric vein; they had probably been swallowed at some previous date, and must have passed, probably as one bristle, through the wall of the intestine and that of the vein, though no trace could be discovered of their passage. When the spleen became purulent it was so much softened that it

gave the erroneous impression that its enlargement had lessened. Kuhn demonstrated to the Amsterdam Biological Society³¹⁹ July 20, '96 the organs of a patient who died of liver-abscess. It was found that a piece of cocoa-palm fibre had perforated the wall of the stomach and penetrated the wall of the superior mesenteric vein. This caused phlebitis, which extended into the liver-tissue, producing pylephlebitis, which was diagnosticated during life as mesenteric abscess from retrograde embolism.

DISEASES OF THE GALL-BLADDER AND DUCTS.

Cholelithiasis.

G. W. Webster, of Chicago, June 22, '96⁶¹ states that catarrhal jaundice, cancer of the pancreas, gall-bladder or ducts, cancer or tuberculosis of the liver, malaria or cardiac disease may give rise to symptoms simulating those of stone in the common duct. Musser, of Philadelphia, June 22, '96⁶¹ is guided in the diagnosis of the latter disease largely by the examination of the blood, but gives no details, however,—a diagnostic factor, also valued by W. M. Lewis, of Baltimore, May 25, '96¹⁰⁴ in obscure cases.

A. L. Benedict, of Buffalo, June 8, '96⁹ in discussing several cases of gall-stones in which biliary colic was not present, remarks that the diagnosis in such cases is at present usually not made till the autopsy. Dull pain in the region of the liver and vomiting were the symptoms of biliary lithiasis noted. The gall-bladder is not usually palpable; it could be felt in one of the cases described, but not in the others.

Henry Morris, of London, Feb. 2, '96² points out the possibility of confusion between a distended gall-bladder and movable kidney. To distinguish between the two conditions it must be remembered that a distended gall-bladder, as well as the kidney, is a frequent cause of movable abdominal tumor. The range of motion in the gall-bladder is, however, always in the arc of a circle, the centre of which is a point beneath the right lobe of the liver. The history of a distinct attack of jaundice is an important factor in diagnosis. A distended gall-bladder can generally be felt, whereas a movable kidney often cannot. The gall-bladder, if distended with stones, is much harder than the kidney.

Létienne, of Paris, Aug. 14, '96³ describes a case of biliary lithiasis in which Terrier performed cholecystostomy. The gall-bladder showed the anatomical lesions common to old calculous cholecystitis, but there was also a parietal diverticulum containing calcareous concretions; there were twenty-one calculi in the cavity of the bladder and some calcareous concretions in its walls. Bac-

teriological examination of these portions revealed the presence of the bacterium coli and streptococcus in the bile and the bacterium coli in the parietal concretions. The case seems to the author to support the theory of a parasitic origin of gall-stones, and to show that the bacterium coli, according to its habitat, may cause transformations in the humors of the organism leading to the formation of concretions differing chemically from one another. Biliary and parietal calculi, though of heterogeneous constitution, may thus be attributed to a microbic origin.

C. M. Chadwick, of Leeds, ^{May 25, '95} reports a case in which a solitary attack of biliary colic (January, 1889) was followed by jaundice, which persisted till death, six years later (December, 1894). The case when seen, in 1892, was regarded as one of malignant disease, there being hepatic enlargement, tenderness on pressure, and much ascites, without any obvious splenic enlargement. In 1894 the abdomen was retracted; there was no ascites; the spleen was enormously congested. Copious hæmatemesis occurred, followed by death in a few days. An impacted gall-stone was found on post-mortem examination. The case was interesting on account of its long duration. Xanthelasma was present in 1892, but was not demonstrable in 1894. There was no indication of any malignant change anywhere.

Cases in which voluminous calculi were spontaneously expelled through an abscess in the abdominal wall are described by A. Guépin ⁷_{No. 17, '94} and Pilcher, of Brooklyn. ¹⁵⁷_{Sept., '95} A case in which a stone weighing 12.5 grammes ($3\frac{1}{2}$ drachms) passed spontaneously *per anum* by a patient, two months after an attack of intestinal obstruction, is described by T. K. Monro, of Glasgow. ²¹³_{June, '95} In a fatal case of intestinal obstruction, J. A. Atkinson, of Starbeck, ²_{Mar. 2, '95} found post-mortem a large gall-stone (one and one-half inches by one inch) in the duodeno-jejunal flexure, the gall-bladder being indistinguishable and the duodenum adherent to the liver. The impaction so high up was due to the longitudinal axis of the stone being in the transverse axis of the gut. Constipation had been marked throughout.

A case of biliary obstruction by a calculus, with intermittent pyrexia, was reported to the Chicago Pathological Society by Eliza H. Root. ⁶¹_{May 25, '95} At the autopsy, made by Vida A. Latham, a calculus two inches in length was found in the bile-passage at the junction of the cystic and hepatic ducts, the latter being larger than the gall-bladder. The attacks had continued for thirteen years, with the intermittent pyrexia, which pyrexia was attributed by the speaker, and also by J. B. Murphy, to septic infection of the liver from the common duct. Kinnicutt, of New York, ⁵⁹_{Dec. 9, '94}

however, regards it as certainly not of a septic character, though its true nature is as yet unsettled.

K. Hintze, of Cologne, ³⁴_{Mar. 5, '96} observed a fatal case of cholelithiasis with the formation of gas in the liver, produced, the author believes, by the coli bacillus, which, as is known, possesses this property in certain media, and which was found in the bile and the liver at the necropsy, and during life in fluid removed from the pleura. There was a bilateral purulent pleurisy secondary to the cholelithiasis.

H. A. Duffett, of Malpas, Cheshire, ²_{May 18, '96} describes a case of fatal hæmatemesis from ulceration of a gall-stone into the duodenum. M. B. Schmidt ³²⁶_{B. 52, H. 5, 6} gives the notes of a post-mortem examination in a fatal case of hæmorrhage from an aneurism of the hepatic artery in a case of cholelithiasis. The patient was a woman in the service of A. Cahn and had suffered from symptoms of gall-stones for some time. Another instance is placed on record by G. Marion. ⁸²⁷_{Dec. 19, '94} Other articles on cholelithiasis worthy of mention are those by H. H. Levy, of Richmond, Va. ²⁰⁷_{Sept., '96}; H. Hill, of Toronto ³⁹_{Jan., '96}; J. A. Ouchterlony, of Louisville ²⁰²_{June 25, '96}; A. H. Ferguson, of Chicago ⁷⁸⁶_{Sept., '96}; and L. Galliard, of Paris. ³¹_{Dec. 22, '94}; ¹¹⁵³_{Oct. 5, '96}

Treatment.—Much skepticism has been felt and expressed in regard to the benefit alleged to have been derived from the ingestion of tolerably large quantities of olive-oil in the treatment of hepatic colic. The fact that the oil during its passage through the intestines undergoes changes therein, and is voided in masses which bear a striking superficial resemblance to gall-stones, has on various occasions been used as an argument against the oil having had any share in procuring the expulsion of genuine gall-stones. A case which recently came under the observation of Alfred S. Gubb, of London, ²_{Apr. 20, '96} however, seems to show that benefit can be, and is, derived from the method. The patient, who had suffered from hepatic colic to such an extent that he was gradually becoming reconciled to the prospect of a surgical operation as the only means of recovery, was induced to try the olive-oil treatment. He began by taking 5 grains (0.32 gramme) of calomel at night, followed by 8 fluidounces (250 grammes) of pure olive-oil in the morning. He experienced no difficulty in swallowing the oil, which never provoked nausea, still less actual sickness. After the very first dose the pain ceased and the motions became darker, evidently containing bile. In the course of two or three days they resumed their natural appearance. At the same time the urine changed from a dark brown to a light color. In a month all symptoms had disappeared and had not returned a year later. No stone was ever detected in the fæces, though, for a time

at any rate, the patient made diligent search, which was rendered very tedious by the presence in the motions of numerous concretions of cheesy consistency, evidently due to the partial saponification of the oil. Nothing can at present be felt in the region of the gall-bladder, and the patient is in the best of health.

William H. Stephenson, of Manchester, ²_{May 25, '95} tried the method as a last resort in a case, with the result that six large gall-stones were evacuated within twenty-four hours after beginning the use of the oil, followed by complete recovery, maintained a year afterward. J. Michell Clark, of Bristol, ²_{July 13, '95} reports three cases in which the use of an initial dose of 1 ounce (31 grammes), rapidly increased and floated upon the surface of a bitter acid infusion, resulted in success. Eight grains (0.52 gramme) of sodium salicylate, in a mild saline purgative, were also given before breakfast two or three times each week during the administration of the oil. The maximum daily dose of the oil was 8 ounces (250 grammes) and the duration of the treatment from six weeks to three months. F. Blum ³⁴_{Mar. 19, '95} successfully treated five cases by means of rectal injections of olive-oil, giving from 300 to 500 grammes ($\frac{3}{8}$ to 1 pint) of pure warm oil, at first daily, then every two and three days until finally dispensed with. E. M. Brockbank, of Manchester, ²_{Apr. 20, '96} advocates the injection of olive-oil for impacted biliary calculi, instead of the usual surgical operation. The olive-oil treatment is also discussed by Watin ²¹²_{Oct. 10, '95} and Gumprecht. ⁶⁹_{No. 17, '95} Interesting articles bearing on the general treatment of the affection are published by T. S. Southworth, of New York, ⁵⁹_{Dec. 15, '94} and E. Golinwin. ⁸⁵⁹_{Nos. 50, 52, '94} Galliard ³¹_{Mar. 23, '95} calls attention to the pleural complications of cholelithiasis and the necessity of watching them carefully, of aspirating or, if there be pus, of performing pleurotomy.

Cancer of the Gall-bladder.—According to Delano Ames, of Baltimore, ⁷⁶⁴_{V. 5, No. 41, '94} primary cancer of the gall-bladder is much less uncommon than was formerly believed. It occurs most frequently in females, the ratio being 3 or 5 to 1. It is met with more particularly in the middle decade of life. Gall-stones are found in from 91 to 95 per cent. of the cases, and probably bear a causative relation to the disease. Metastasis is not extensive, but invasion of neighboring organs by continuity is common. Adhesions to adjacent organs frequently occur. Ulceration and perforation are more rare. Pain, jaundice, cachexia, emaciation, tumor, indigestion, nausea, vomiting, constipation or diarrhœa, with occasional ascites and œdema, are the chief symptoms. According to Musser ²⁰²⁷_{V. 4, '89} pain occurs in 62 per cent., jaundice in 69 per cent., and tumor in 68 per cent. The disease is always fatal, and usually in a short time, the average duration varying, accord-

ing to the best authorities, from three to six and two-third months. Death is due to exhaustion, peritonitis, metastasis to other organs, and to biliary obstruction.

J. E. Graham, of Toronto, ³⁹_{May, '95} records a case of a man who had suffered for years from "bilious attacks." The chief symptoms were nausea and vomiting. On coming under observation he was weak and emaciated, slightly jaundiced, but with no pain or vomiting; liver enlarged and tender on pressure; fæces gray and sticky, containing fat as well as indol and bacteria. The liver increased in size rapidly up to the patient's death. The diagnosis of primary carcinoma of the liver or gall-bladder was made during life for the following reasons: 1. There was no history of primary cancerous disease in the pylorus, cæcum, sigmoid flexure, or rectum. 2. There was a history of biliary colic, with inflammation of the biliary passages. 3. The absence of marked jaundice excluded primary cancer of the biliary passages. At the post-mortem a cancerous mass was found, originating in the gall-bladder, with secondary growths in the liver.

In a case of extensive epithelial cancer of the gall-bladder seen by Bouglé and Polliet, of Paris, ⁷_{Nov., '94} no calculi were found post-mortem, though such a diagnosis had been made before death, based on the clinical signs, hepatic colic, etc.

Oesterreich, of Berlin, ¹⁶⁴_{Dec. 5, '94} noted complete absence of glycosuria in a case in which a cancer of the gall-bladder had almost entirely destroyed the pancreas; and Ewald, who, in the discussion, cited a similar instance, remarked that such cases were not rare. Marcuse had found glycosuria to be absent when the destruction of the pancreas was rapid.

H. Deetjen, ³²⁶_{B. 55, p. 211} adds to the fifteen cases collected by him from literature another instance of cancer of the ductus choledochus.

DISEASES OF THE PANCREAS.

Fat-Necrosis.

An important experimental study of this subject has been made by Hildebrand, of Göttingen, ³³⁶_{Mar. 23, '95} ²¹³_{Oct.} who, believing the pancreatic juice to be the agent that excites the affection, arrested the flow of this secretion by operation. He ligatured the splenic portion of the pancreas of a cat in two places. In six other animals he at the same time tied the veins coming from the gland, so as to prevent removal of the juice by the blood. The animals survived for about ten days, becoming greatly emaciated; in one instance there was glycosuria. After death it was found that there

was no peritonitis; but at the place where the ligature had been applied, and in the region of the pancreas generally, whitish opaque spots, like fat-lobules, were observed in the mesentery. Hildebrand thereafter removed a piece of the pancreas of a cat and grafted it in the mesentery of another cat; while in a third animal he introduced a whole pancreas into the abdominal cavity. The cats lived for several weeks. No peritonitis occurred, but here again fat-necrosis was discovered after death. This occurred in the animal in which section of the pancreas in its continuity allowed the secretion to flow into the abdominal cavity, as well as in the others. Obviously the necrosis was due to the action of the pancreatic juice. The question now remaining was as to the particular constituent of the secretion which possesses this property. A pupil of Rosenbach, who experimented with pancreatin mixed with other constituents of the pancreas, found dilatation of the vessels and necrosis of fatty tissue. Hildebrand repeated these experiments with pure trypsin. When he employed only small quantities the animals appeared not to suffer. When he sprinkled larger quantities—say, 1 gramme (31 grains)—over the intestines he found after death that the intestines were streaked with blood; there were hæmorrhages under the serous coat, but not a trace of fat-necrosis. Hildebrand, therefore, concludes that fat-necrosis is due to the action not of trypsin, but of certain fat-ferments.

The histories of two cases of fat-necrosis were presented by C. G. Stockton and H. U. Williams, of Buffalo, ⁵_{Sept., '96} to the Association of American Physicians. Both patients were males, both Swedes, coming under the authors' care within two weeks of each other. The autopsies showed a very similar condition present in each case,—a condition rather at variance with what is usually found in such cases. In both there was well-marked disseminated fat-necrosis, and in neither was there well-marked pancreatic change. Beyond the presence of a very limited number of areas of fat-necrosis in the interstitial tissues of the gland and the occurrence of hæmorrhages small in number and trifling in degree, the pancreas in neither case showed more change than is often seen in the perfectly healthy pancreas taken from the cadaver and preserved in the same way. The histological alterations in the pancreas were accounted for, in the authors' opinion, by the condition of the surrounding tissues,—a view not sustained by R. H. Fitz, of Boston, who, in the discussion of the paper, ⁹⁹_{June 20, '96} quoted the experiments of Hildebrand, just referred to, and similar ones by Whitney, of Boston, as being all that is necessary to show that multiple fat-necrosis associated with pancreatic disease is the result of such disease,—a view which is in direct opposition to that of

Balzer and many German writers. Other cases of fat-necrosis, with post-mortem examinations and similar findings, are related by von Kahlden, of Freiburg ³⁴ Mar. 19, '95; Caspersohn ³³⁶ No. 47, '95; Marchiafava, of Rome, ⁶⁷³ Aug., '95 and E. de Grazia, of Naples. ²⁰³⁰ '94

Pancreatitis.

J. E. Paul, of London, ² Oct. 20, '94 gives the history of a case of acute pancreatitis in which the prominent symptoms were the sudden onset of pain, which was colicky in its nature and of short duration; constipation, and some vomiting. There was slight distension of the abdomen and the pulse and temperature were somewhat increased. After the action of a simple enema the patient suddenly collapsed, the temperature rose to 104° F. (40° C.), and death followed speedily. The urine passed just before death contained a large amount of albumin and granular and hyaline casts. Post-mortem examination showed an acute hæmorrhagic and parenchymatous pancreatitis. The remaining organs were healthy except a cloudy swelling of the kidneys.

An ante-mortem diagnosis was made in cases published by Körte, of Berlin, ³ Apr., '95 and E. G. Cutler, of Boston. ⁹⁹ Apr. 11, '95 W. S. Thayer, of Baltimore, ⁵ Oct., '95 has observed six cases of acute pancreatitis at autopsy and one at operation during the past six years. In all but one the process was associated with disseminated fat-necrosis.

At the autopsy of a case of hæmorrhagic pancreatitis seen by Kraft ³⁷³ p. 895, '94 ⁶⁷³ Mar., '95 some signs of peritonitis were discovered, but the bowels were in a healthy condition. The liver was large and in a state of fatty degeneration. A large infiltration of blood around the pancreas extended to the base of the large omentum and into the ascending mesocolon, as well as into the retroperitoneal connective tissue. The pancreas was double its normal size and speckled with yellow and dark-red spots. Microscopical examination of its tissues revealed bloody infiltration and numerous leucocytes between the acini, which themselves were so degenerated in some places as to consist of a granular or almost homogeneous detritus containing but a few nuclei. A. Jung, of Göttingen, ²⁰²⁸ '95 from a careful experimental study of the pathogenesis, attributes acute pancreatitis to a disturbance in the normal secretion of the organ. J. E. Atkinson, of Baltimore, ⁶¹ June 29, '95 was able to diagnose during life a case of acute suppurative pancreatitis in a woman, 35 years of age, whose illness dated back fifteen months, when she had an attack of what appeared to be hepatic colic. Presence of blood-cells and coloring matter in the contents and walls of the abscess-cavity pointed to an antecedent hæmorrhagic

condition. J. H. Musser, of Philadelphia, ¹¹²_{Mar., '96} gives the history of a case of subdiaphragmatic abscess due to pancreatic abscess.

Cancer.

W. P. Herringham ⁴⁰⁸_{v.30,p.5,'94} states that when a patient who suffers from deeply-seated pain in the epigastric or hepatic region, with progressive emaciation, but without signs definitely indicating gastric cancer, with jaundice and dilatation of the gall-bladder, without a history of biliary colic, by far the most probable diagnosis is primary cancer of the pancreas. This diagnosis is not much affected by the state of the liver, which may be large or small and may or may not contain palpable cancerous growths. If the gall-bladder is not dilated the diagnosis must remain uncertain. He bases these views on the post-mortem examination of seventeen cases. In two instances, occurring in the practice of Guthrie Rankin, of Warwick, ²_{May 11, '95} the leading positive signs were great emaciation, excessive weakness, paroxysms of pain, and, in the later stages of the illness, deep epigastric tenderness, while in one of the cases there was the evidence of a lump in the epigastrium. Negatively, there was an absence of fatty stools, glycosuria, prominent digestive disturbances, persistent jaundice, and malignancy in the family history. These two cases go to prove that, even in advanced conditions of structural disease of the pancreas, no fat may be found in faecal discharges. The motions were also not always colorless, which is contrary to the ideas expressed by Claude Bernard and Walker, and sugar was invariably absent from the urine during the whole course of both cases. Stearrhœa, according to Huchard, ³⁵_{Jan. 26, '95} is not a reliable sign, and he notes instead abundant and frequent diarrhœa at the beginning of the affection. Icterus is a relatively valuable sign, though absent in cases where the common duct is not compressed. The diagnostic symptoms relied on by E. R. Maxson, of Syracuse, ¹_{Sept. 21, '95} are a voracious appetite and total perversion of relish or taste for food, eating and relishing one kind as well as another, together with emaciation and overwhelming progressive weakness, with a peculiar cachectic countenance, not strictly icteric. On these signs only he was able to base a correct diagnosis in two cases which afterward came to autopsy.

A. Cochez, of Algiers, ⁹²_{July, '95}; ¹⁵_{Oct.} dwells on the importance of hepatic symptoms in the diagnosis of cancer of the pancreas, and quotes two cases in which these symptoms were prominent. The first was that of a woman, 55 years of age, who had always had good health and who developed, in the space of three months, all the signs of abdominal cancer. The clinical course of her disease

was divided into two distinct divisions, the first marked by complete intolerance of stomach and obstinate constipation, and the second by jaundice of about three weeks' duration. After death a cancerous mass was found implicating the great omentum and the pancreas; the liver was irregularly enlarged, but there were no secondary growths. The biliary canals were dilated, but the gall-bladder was only represented by a piece of fibrous tissue. The author especially draws attention to the hypertrophy of the liver and the atrophy of the gall-bladder, because Bard and Pic have described the usual hepatic signs as being chronic progressive jaundice, absence of hypertrophy of liver, and dilatation of gall-bladder. Cochez thinks that these discrepancies are due to the fact that the liver varies in size during the disease, being first enlarged, and later—if life is prolonged long enough—atrophied. The atrophy of the gall-bladder he explains by the involvement of the hepatic or cystic ducts. The second case was marked by deep progressive jaundice, emaciation, and diarrhœa, with some increase of liver-dullness. Post-mortem examination showed that the liver weighed 2150 grammes (69 ounces); the biliary ducts were largely dilated, the gall-bladder had almost disappeared, but there were no secondary growths. There was complete involvement of the pancreas by cancerous growth. The author thinks suppression of the gall-bladder a grave sign, as it exposes the patient to the dangers of the secondary jaundice, which, singularly, shortens the duration of the disease; and he sums up by saying that, in biliary cirrhosis due to cancer of the pancreas, the evolution of the disease will take longer—other things being equal—when the gall-bladder remains permeable, while in cases of suppression of this reservoir by compression of its afferent canals the duration will be short and death will be brought about by hepatic insufficiency accompanied by an increase in size of the organ. E. F. King, of Washington, ^{Jan. 19, '95} operated on a case of hypertrophy of the liver following obstructive jaundice, which was found, post-mortem, to be due to cancer of the head of the pancreas.

A case of chronic icterus simulating an intestinal infection, and due to cancer of the pylorus and head of the pancreas, is reported by L. Fløersheim, of Paris ^{Dec., '94}; and a case of primary cancer of the head of the pancreas, becoming generalized in the liver, by E. de Massary, of Paris. ^{Dec., '94}

Sarcoma.

A case of primary sarcoma of the head of the pancreas, with hour-glass contraction of the stomach, simulating pyloric stenosis during life, is published by D. J. M. Miller, of Philadelphia. ^{59 Aug. 31, '96}

Cysts.

There are so many points that require elucidation in connection with pancreatic cysts that nearly every case is worthy of record. The instance recorded by Theodore Fisher, of Bristol, ²_{Dec. 15, '04} is noteworthy on account of a long history of epigastric pain which preceded the tumor; on account of the sudden appearance of the cyst within a few hours; of the contents, which proved to be sanguineous; and of the perfect health of the patient after its surgical treatment. The author regards the case as confirming his belief that all so-called pancreatic cysts may be due to hæmorrhagic effusions either arising in the gland or in its neighborhood, and that the cause of such hæmorrhage is probably a lesion of the sympathetic system that at first manifests its presence by intermittent attacks of epigastric pain.

Leith, of Edinburgh, ²²_{July 10, '96} holds the view that the cysts are often due to extravasations of blood outside the pancreas itself. A. Tilger, of Geneva, ²⁰_{B. 137, H. 2} in a case of multiple pancreatic cysts in an alcoholic patient 52 years old, noted a chronic interstitial inflammation of the connective tissue in the region of the tail of the organ. This tissue had constricted the lobes by forming fibrous rings about them, thus leading to disturbed circulation, retention of the secretion of the acini, fatty degeneration of the gland-cells, liquefaction of the contents of the pockets, disappearance (by digestion) of the membrane proper, necrosis of the interstitial connective tissue, and confluence of the acini, and, from all this, the production of small cysts. It is possible that the consecutive hæmorrhage may be due to erosion of vessel-walls, rendered easy by compression of neighboring veins, though the disturbance of nutrition, due to circulatory modifications and alteration of epithelium, must also be borne in mind as a factor. Tilger is thus inclined to regard the hæmorrhage as an indirect result of alterations in the acini, and not as a special variety of pancreatic cysts.

Syphilis.

The case of sclero-gummatous disease of the pancreas, observed by Schlagenhauser, ⁴⁵_{No. 1, '96} is apparently unique. The patient, who died in Neisser's clinic from lobar pneumonia, had also presented paralysis of the vault of the palate and was suffering from syphilis. At the autopsy there was found to be revealed syphilitic diseases of the liver and testicles. On cutting down on the pancreas the head of the gland was found to be extremely hard. The sclerosis had invaded all the tissues. About the centre of the body of the gland a portion about the size of a hazel-nut was soft and, microscopically, was found to be gummatous.

CHOLERA; DISEASES OF THE INTESTINES AND PERITONEUM; INTESTINAL AND OTHER PARASITES.

BY THE CENTRAL EDITORIAL STAFF.

SUBMITTED FOR COMMENTATION TO

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CHOLERA.

Etiology.—Cholera vibrios in faecal matter, as a rule, die within the first twenty days, seldom living for thirty days. This, at least, is the conclusion arrived at by Abel and Clausen⁵⁰_{B.17,p.77} after careful experiments in cases of cholera at the Hygienic Institute of Königsberg. In many cases the vibrios could not be found after two or three days; so that the advisability of immediate examination of the dejecta is evident. In some cases Koch's vibrios were found in the stools of persons showing no symptoms of cholera nor suffering from diarrhœa, with or without cramps, but without collapse. Rumpel, of Hamburg,⁴_{No.4,'95} found them in formed stools. Abel and Clausen examined the stools of seventeen persons isolated from families in which cholera had occurred, some of these individuals being in good health, others suffering from diarrhœa. They found the Koch vibrios in the stools in thirteen of these cases, they being sometimes absent for one or two days. In one case, in which no vibrios were found on examination of a stool, the subject was seized the same night with cholera, which was fatal within forty-eight hours, vibrios being then present. Kolle⁵⁸_{B.18,H.1} mentions some cases in which normal stools were found to contain the vibrios; the cases were then isolated and in a few days had moderately severe or mild attacks of cholera, the diarrhœal stools then containing many vibrios. Assuming the vibrios to be the exciting cause of cholera, it is evident that some persons exposed to their action are at times proof against them, and also that this immunity is not due to the killing of all the microbes by the acid contents of the stomach.

Of late years examinations have been made of river-water,

sewage, and drinking-water, with the result that numerous vibrios have been found, some of which resemble more or less closely those of Koch. ⁹⁰ July, '95 Dunbar ⁶⁹ p.138, '95 has one hundred and fifty in his possession from all parts of Europe, some differing very much in character from Koch's vibrio, but none of them of striking differences from the vibrio that he, himself, produced by growing a typical specimen for some time in water. Vibrios were found in the sewage of Paris, in the Seine, and in the drinking-water of Versailles by Sanarelli, ²⁶² v.7, p.693 in the summer of 1893, when there was no cholera in Paris or Versailles. The vibrios gave the cholera-red reaction and were pathogenic to animals. Pfeiffer ⁵⁸ B.1, p.759 found that the Versailles vibrio behaved like that of Koch, while one of the Seine vibrios gave negative results. He also got negative results with vibrios isolated from the Spree at Berlin, the Oder at Stettin, the Berlin water-supply, and the Havel at Potsdam. At each of these places there was no case of cholera at the time. The two latter vibrios were typical and gave the cholera-red reaction. In ten cases where the water either might easily have been polluted with cholera dejecta or was actually used as drinking-water by persons who were attacked by cholera, the vibrios isolated from it gave this reaction. The vibrios from the Massanah epidemic, although presenting characters different from those of Koch's vibrio in some respects, yet gave the cholera-red reaction, was highly pathogenic, and was found in the stools of cases presenting the characters of cholera; hence it was assumed to be a true cholera vibrio.

Sanarelli ²⁶² Mar.25, '95 and Kutscher ⁵⁸ B.19, p.461 have made observations which show the possible origin of some of these water vibrios which resemble those found in cholera. It was well known that vibrios occurred in the intestines of guinea-pigs, but they had not been cultivated. Sanarelli found that by first neutralizing the contents of a guinea-pig's stomach, and then introducing into the stomach or abdomen a dose of cholera poison, with or without simultaneous injection of a dose of typhoid poison, the animal so treated died just as it did when, instead of cholera poison, the living vibrios of cholera were used; and in the intestines of the animal vibrios were found and could be cultivated. These vibrios give the cholera-red reaction and are pathogenic when tested with guinea-pigs. The action of the cholera toxin is to produce an intestinal lesion, which leads to an increase in the virulence of the vibrios normally present in the intestines of animals; hence the vibrios are not killed in the intestines, and can be cultivated from the intestinal contents. Kutscher found vibrios having the character of Koch's vibrios in the Lahn below Giessen, but did not find

them above, and, on tracing these back to their source, it was proved that they were derived from the farm-yard manure, and the constituent which yielded the vibrios was the fæces of pigs. These vibrios were first found at the end of September. There had been no cases of cholera at Giessen for years.

Klein²⁰⁰⁴_{App.B., No. 17} gives the results of the bacteriological examination of samples of stools and intestines from suspicious cases of cholera, 56 in number, from 53 cases. Of these, 6 were spoiled by the use of antiseptics, and of the remaining 47 Koch's vibrio was found in 30. He found the vibrios differed from each other in some marked respects,—shape, rate of liquefaction of gelatin, formation of scum on broth cultivations, color of growth on potato. In 15 of the 30 cases he could detect the presence of Koch's vibrio by microscopical examination alone. In the 30 cases epithelial flakes were found in all the stools. In the 17 cases where Koch's vibrio could not be found, epithelial flakes were found in 4 fatal cases, and flakes composed of leucocytes in 6 cases which recovered; so that epithelial flakes in the stools of a patient having the clinical signs of cholera must be looked upon as of bad omen. Klein admits the diagnostic value of Koch's vibrio, but does not commit himself as to its etiological importance.

For the purpose of throwing light on the epidemiological conditions of cholera, so far as they do not directly depend for their explanation on the properties of the comma bacillus, Metschnikoff²⁶²_{p. 529, '94; Aug. 10, '95} investigated the conditions of Versailles, which he speaks of as immune from cholera, and St. Cloud, which is not immune to the same degree. In the water-supply of both places cholera vibrios—or, at any rate, vibrios indistinguishable from those of cholera and capable of inducing diarrhœa in man—were found by Sanarelli, as previously stated. According to Metschnikoff the cholera vibrio can grow freely in water and be found in it undiminished in virulence several months after the end of an epidemic. But since the vibrio behaves in the same way in the water of places immune from cholera, local immunity against cholera cannot depend upon the fact that cholera vibrios cannot live in such immune places. Nor can the immunity depend upon the fact that, by repeated small doses of the water, the inhabitants have become immune, since the blood-serum of persons living in immune places does not confer immunity upon guinea-pigs. From choleraic dejecta that had been preserved for several months colonies were obtained identical with those of the cholera vibrio, but differing in the respects that they grow only at temperatures beneath 30° C. (86° F.), gave no indol reaction, and were not pathogenic for animals. These organisms were sown on gelatin

plates, but refused to grow. On leaving the plates exposed to the air a small number of other microbes fell upon them. The greater number of these had no apparent influence upon the vibrios, but by some *sarcinæ*, and particularly by some yeasts, the growth of the vibrios was markedly affected; so that if the author wished to revivify a vibrio that would no longer grow he inoculated, along with it, one of several micro-organisms and obtained his object. Many micro-organisms act in the opposite way. Metschnikoff isolated from the contents of the stomach a *sarcina*, a *torula*, and a non-liquefying bacillus, all of which favor the growth of the vibrio; while in the guinea-pig's intestine he found others that hinder the growth. It follows, therefore, that the cholera vibrio is considerably modified by the micro-organisms which surround it. He concludes that immunity or susceptibility of man and other animals in the case of cholera largely depends upon the other microbes in the intestinal canal. By means of this fact the fundamental truth that Koch's comma bacillus is the specific cause of cholera can easily be reconciled with the information given by epidemiology.

[These investigations of Metschnikoff are valuable and very suggestive, for the studies of the last few years have produced considerable uncertainty regarding the etiology of cholera.—J. P. C. G.]

Similar conclusions are reached by A. Fawitzky⁵⁸⁶ and Rontaler.³⁴ J. Cantacuzène²⁰⁰⁰ believes that the phagocytes^{Nos. 47, 51, '94} are the only agents destroying the cholera vibrios in the tissues. The subcutaneous exudation of a vaccinated guinea-pig, under the skin of which vibrios are injected, shows a few hours later 700,000 leucocytes per cubic millimetre, almost all filled with degenerated vibrios, while no free vibrios are to be seen; on the other hand, if a fresh, unvaccinated guinea-pig be used for the experiment, the exudate will show only about 400 leucocytes per cubic millimetre and an enormous number of free vibrios. The antagonism claimed by Gabritschewsky and Maljutin to exist between the cholera vibrio and the comma bacillus is denied by Kempner,⁵⁰ who observed them growing side by side in a mixed culture, as well as in hen's eggs, without any reciprocal action. The disappearance of the comma bacillus from the stools in cases of cholera is therefore not due to any antagonism between the two, but to the fact that the profuse evacuations cause the comma bacillus to be entirely expelled from the intestinal canal, while, the nutritive medium being changed, an exuberant growth of vibrios takes place.

The resistance of cholera bacteria to cold has been studied by quite a number of authors, among whom may be mentioned

Weiss, ⁵⁸_{B.18, H.3, '94} who believes that there is not much danger of communication of the disease by ice, agreeing in this respect with Koch and various other experimenters. On the other hand, Kasansky, ⁵⁰_{p.184, '95} in his experiments, found that the vibrios resisted a temperature of -31.8° C. (-24° F.). One culture remained frozen for twenty days and yet survived. They withstood alternate freezing and thawing, even though the process was repeated a dozen times. Hence he believes that the germs may survive an entire severe winter. E. H. Hankin, ¹⁰⁹²_{Feb., '95} finds that, though there is reason for thinking that the cholera microbe degenerates rapidly in well-water, there is no reason for thinking that it degenerates in water that contains a sufficient amount of food-materials.

The communication of cholera by means of milk has attracted the attention of many investigators, among whom are Joseph Schrank ¹⁰⁴⁹_{No.1, '95} and W. Hesse, ³⁸⁶_{B.26, p.652} the latter of whom concludes that cholera bacilli are destroyed in fresh milk within twelve hours at the latest. Fritz Basenau, ³²⁴_{B.23, H.2, '95} on the contrary, finds, from his experiments, that the bacteria live at least thirty-eight hours, and that they may continue to develop until the milk coagulates, at ordinary temperatures. He has even demonstrated their presence in a living state in coagulated milk.

A contribution to the study of water-borne cholera is made by George Homan, of St. Louis, ¹_{Mar.30, '95} based on one hundred and seventy-five cases among soldiers in 1866. There is no doubt in his mind that this body of men was poisoned by St. Louis sewage borne in the current of the river as far south as Helena, for the soldiers began to sicken and die within twelve hours after embarking, and no other source of water-supply was accessible to them except the river,—evidence showing the direct, positive agency of polluted streams, used as sources of human water-supply, in the causation and spread of Asiatic cholera.

The researches of Oetvös, of Budapest, ¹⁴_{Jan.9, '95} based on nineteen thousand cases of cholera observed in that city in 1892 and 1893, show that where non-filtered water was used the epidemic raged most severely. An epidemic of cholera in 1893 at Fontaine, St. Martin, France, carefully studied by Fallot, Cassoute, and Bouissou, ⁴⁶_{Oct.1, '94} plainly demonstrate the cause to have been contaminated water; and similar proof was obtained by B. Körber, ⁵⁸_{p.161, '95} in an investigation of the epidemic occurring at Dorpat, in 1893. In a small epidemic at Bürgeln, in which sixteen persons were affected, four fatally, von Heusinger and C. Fränkel, ⁴_{Mar.25, '95} found several species of vibrios in three springs in the locality. Two of these bacteria resembled Koch's vibrio, though the authors were not able to positively establish their identity with it.

Frank Clemow, of London, ²_{Oct. 13, '94} cites numerous instances in support of the theory that cholera is a water-borne disease, though he admits that the epidemic in Russia has indeed furnished strong evidence that local conditions, such as elevation and dampness of the soil, are important factors. P. Rosanoff ¹⁶⁴_{Jan. 2, '95} warmly defends the relation between the direction of the winds and the moisture of the atmosphere. The observations of W. G. King, presented to the Indian Medical Congress, ²_{Feb. 2, '95} seem to show that the prevalence and mortality of cholera in the Madras Presidency were governed by the two monsoons with which it was visited. Temperature *per se* could not be a dominant factor because the maximum of one set of districts occurred in the hot weather and of the other in the cold. Conveyance of germs by aerial currents was a plausible theory, but it had been disproved by careful observation. The districts that received the most direct and potent impact of the monsoon current were not those which showed most cholera. It was, the author believes, the effect which the rain-fall, brought by these monsoons, caused upon the level of the subsoil water, and the fluctuations to which that was consequently subject, which constituted the dominant factor of the seasonal intensification of cholera; or, in other words, furnished the conditions most favorable for the development of the cholera poison and for its entry into the human system through the agency of water and, perhaps, of the lower stratum of the atmosphere.

Von Pettenkofer ²_{Nov. 9, '95} continues to combat what he calls the "bacteriological-contagionist view" of the causes of cholera. His chief arguments are: 1. That the Hamburg cholera epidemic of 1892 ran almost exactly the same course as the epidemics of 1832 and 1848; that, in fact, the mortality in 1892 was greater than in the two previous great epidemics, the numbers being, in 1832, 11.29 per 1000; in 1848, 10.50 per 1000; and 1892, 13.44 per 1000; and this in spite of the vigorous measures taken from a bacteriological point of view. These measures, he adds, have in Hamburg shown themselves to be absolutely ineffectual. 2. That the contagiousness of cholera receives no support from the history of the Hamburg epidemic of 1892. Pettenkofer quotes, from Wolter's publication on the epidemic, that in 12,473 cases, of which 6746 ended fatally, the attack remained isolated in the household, and that only in 4483 cases,—about a quarter of the total number,—with 1859 deaths, was more than one person in a household attacked. In conclusion, Pettenkofer expresses the opinion that the many millions which have been needlessly wasted in measures against contagion would have been better employed in improving the sanitary conditions of the dwellings.

Amsterdamsky ⁵⁸_{B.19,p.507} is of opinion that personal intercourse played the greatest part in the spread of cholera in the Petrowsk Circle of the Saraton government in 1892. Interesting studies of cholera epidemics are published by Courtet and Delaborde, of Tunis, ²⁴³_{Jan., '95} and L. Ph. Van Kleef, of Limburg, Holland. ⁵⁸³_{No.25,'95}

Pathology.—F. J. Bosc, of Montpellier, ²⁶²_{June 25,'95} concludes, from experiments with the fluids in cholera, that these, especially the blood and urine, may be very toxic and reproduce in animals the most typical symptoms of mortal cholera. The blood-serum in grave cases contains an enormous quantity of a substance which produces effects identical to those obtained by Petri, Pfeiffer, and others with toxins secreted by the comma bacillus, cultivated in an artificial medium. It seems that the symptoms of human cholera depend entirely upon an intoxication by poisons which, secreted in the intestine, penetrate into the blood-current. It may be objected to this latter assertion that the effects produced in rabbits by the intra-venous injection of serum from cholera are not due to the serum itself, but to the development, in the blood of the animals, of occasional bacilli which may exist in this serum. This explanation, according to Bosc, cannot be admitted. The length of incubation is, in fact, in relation to the toxicity of the serum, and becomes almost *nil* in the case of very toxic serum. He has, besides, noted the absence of bacilli from serum taken from the veins in cholera; inoculation of this serum in various media never developed any cultures.

The cerebral pathology of Asiatic cholera has been studied by Tschistowitsch, of St. Petersburg, ²¹_{Aug.17,'95} ⁹⁹_{Sept.12} who made an attempt to ascertain the relation between the conditions observed in the cerebrum in cases in which death had taken place during the algid stage of the disease and cases in which it had taken place during the period of reaction with symptoms of severe cerebral trouble. In rapidly-fatal cases (cases dying in the algid stage of the disease within twenty-five to thirty hours of its inception), unmistakable changes were observed in the cerebrum. In cases dying during the period of reaction the same changes were observed; but of a much more advanced type. In one severe case with well-marked typhoid symptoms cerebral changes were present to a marked degree, between which and those of the algid stage no satisfactory parallelism could be established. The alterations observed chiefly concerned the nerve-cells, but were also to be noted in the vessels. The neuroglia showed but slight deviation from the normal; the nerve-fibres were but slightly affected. The appearances in the ganglion-cells were of the following character: In the rapidly-fatal cases there were evidences of œdema of the cells, which showed

itself in increase of the intercellular spaces and the formation of fine vacuoles in the cell-bodies. Later, certain of the nuclei lost their chromatin (were not affected by nuclear stains), became irregular in outline and indistinct, and finally entirely disappeared. At the same time the cell-substance became cloudy, coarsely granular (albumin and pigment-granules), lost its connection with its processes, and became changed either into a mass of granules surrounding the nucleus or, in case the nucleus had undergone the changes described above, the entire cell was transformed into a collection of granules difficult to stain, which occupied only a part of the broad cell-space. In other cases, after the loss of the nucleus, the cells became more homogeneous, but not highly refracting. In the intercellular spaces, as well as in the walls and bodies of the nerve-cells, round and oval neuroglia and round-cell nuclei were found, but in small numbers; there was no evidence of an increase in their numbers or of pressure upon the nerve-cells. The small arteries, veins, and capillaries were over-filled with blood; the perivascular lymph-spaces were moderately enlarged and contained much extravasated blood, masses of granular pigment and yellow flakes, made up of a massing together of red blood-corpuscles. Pigment-granules were also found within the vessels. Small hæmorrhages were frequent in the cerebral substance. The number of neuroglia-nuclei was greater around the vessels than within the cerebral substance itself, but nowhere greater than normal. An emigration of the leucocytes was not observed, being only present in isolated examples. The cell-substance of the larger neuroglia-elements, with recognizable protoplasm, also underwent granular degeneration; but their nuclei, as well as those of the small neuroglia-cells, were not visibly altered. With respect to the extent and severity of the affection, the frontal and paracentral convolutions showed the most marked changes, the cerebellum and occipital convolutions being the least altered. The remaining portions of the cerebrum took an intermediate position. From these alterations it is evident that the cerebral changes in Asiatic cholera, as well in the algid stage as in the period of reaction, are of the nature of an acute degeneration and necrosis, and not of a perivascular inflammation. The examination of four cases after death led Pernice and Scaglioni⁵⁸⁹_{Oct. 19, '94} to affirm that there is always a more or less severe glomerular nephritis in the algid stage, due to the elimination of toxic principles which pass from the intestine into the blood. The pathological changes of the female genital organs in cholera are discussed by A. Klautsch,³⁴_{Nov. 45, 46, '94} and the various complications attending convalescence from the disease by Lesage and Macaigne.³⁶⁰_{Jan., Feb., Apr., '95}

Diagnosis.—In common with other observers, Delépine and Richmond, of London, ²⁴⁷_{Apr., '05} have come to the conclusion that, by the application of a certain number of tests, it is comparatively easy to identify cholera vibrios in the stools of patients suffering from a choleraic attack, when such vibrios are present. These vibrios, however, vary to a considerable extent in their pathogenic, zymogenic, and chromogenic properties, not only when they grow saprophytically outside the body, but also when they are obtained directly from the intestine of a choleraic patient. The value of statistical returns, based on the bacteriological investigations of observers who ignored these variations, must hence be considered as giving us only part of the truth; because these observers must have considered many cases as free from cholera bacilli when these bacilli, though present, had assumed abnormal characters. On the other hand, we are gradually led to recognize as cases of cholera many cases which formerly would not have been recognized as such. Bacteriological diagnosis has not, therefore, up to the last two or three years, afforded the means of obtaining perfectly comparable data.

According to Ringeling ²²_{Sept. 26, '04} a bacteriological diagnosis of cholera can be made in about five hours, if the proper method of procedure be followed. Nutrient gelatin should be used, melting at 40° C. (104° F.); it should be allowed to coagulate immediately after infection, so that the bacilli may develop on the surface. The method of chemotaxis recommended by Ali Cohen has been found serviceable in several cases. Several capillary tubes, twenty to thirty centimetres long, are filled by being pressed against the juicy surface of a broken potato, then closed by melting at one end, and the empty end cut off by sterilized scissors. The tubes are then laid, with a few drops of peptone culture, upon an object-glass and placed in the moist chamber. After an hour they are covered with large cover-glasses and examined under a high power, when they are seen to be filled with bacilli among the grains of starch. Under similar precautions the tubes may be placed in peptone and broken through. After remaining in this seven hours in an incubation chamber the tubes give a beautiful indol reaction,—a result not obtained before.

Prophylaxis.—Ransom ⁶⁹_{July 18, '05} demonstrates that the cholera virus, found in a culture-fluid freed of micro-organisms, causes a fall of temperature in the same manner as does a virulent bouillon culture. The addition of chloroform, toluol, etc., does not impair its activity, and when concentrated it becomes less virulent. A solid substance can be obtained from this fluid which acts in the same way as the fluid itself, 0.07 gramme (1½ grains) of this solid

being the minimum fatal dose for a guinea-pig weighing 250 grammes (8 ounces). In fatal cases a fall of temperature is noted. The solid substance administered to guinea-pigs by the stomach is harmless. The author had immunized various animals against cholera and had obtained an antitoxin from the blood. Guinea-pigs, when injected with a mixture of the cholera virus and this antitoxin, could stand twice or thrice the minimum dose of cholera virus fatal for animals which had not received antitoxic serum. The latter was efficient, even when injected forty-eight hours before virulent cholera cultures were inoculated into the peritoneum.

Sobernheim⁹³⁰_{p.145,'95} found, in the blood of patients convalescing from cholera, certain substances having a specific immunizing property against the laboratory cholera of guinea-pigs, but inconsistent in amount and efficacy. Gino Galeotti⁸⁵⁴_{Nos.12,13,'95} gives a review of the subject of immunity in cholera, and Pfeiffer⁵⁸_{B.18,No.1} gives the results of some new experiments in this direction.

Haffkine's system of inoculation against cholera has had another year's trial in India, and the results are published by W. J. Simpson, in a report to the corporation of Calcutta.²_{Sept.21,'95} From the time the Haffkine system was first introduced into Calcutta till July 15, 1895, 4397 persons have been inoculated in that city. In 36 houses in which cholera appeared a certain number of the inhabitants were inoculated, but the majority remained uninoculated. These houses furnished valuable means of observation as to the definite value of inoculation as a preventive against cholera in times of epidemic. The total number of the inmates of the 36 houses was 521; of this number 181 were inoculated and 340 not inoculated. Among the uninoculated there were 45 cases with 35 deaths, or 11.64 per cent., and among the inoculated there were 4 cases with 4 deaths, or 2.2 per cent. Of these 4 cases none of the patients had undergone a second inoculation, and 3 of them contracted cholera and died from one to four days after the first inoculation and before the protective influence of the vaccine had had time to assert itself. In spite of this, however, the following figures show that the uninoculated were 6.08 times more liable to attack and 5.27 more liable to death from cholera than the inoculated:—

DURING THE FIRST EIGHT DAYS.

	Average Number Present at Date of Attack.	Cases.	Per Cent.	Deaths.	Per Cent.
Not inoculated	75	6	8.00	4	5.33
Inoculated	52	3	5.77	3	5.77

AFTER EIGHT DAYS.

	Average Number Present at Date of Attack.	Cases.	Per Cent.	Deaths.	Per Cent.
Not inoculated	265	39	14.72	35	13.21
Inoculated	140	1	0.71	1	0.71

It must be remembered that two injections, one five days later than the other, are necessary for full protection, the first with the weak vaccine and the second with a stronger vaccine, requiring another five days to secure complete action. Simpson states that after eight days, and in fact after five days, the difference in liability to attack becomes very marked, the inoculated living in the same houses in Calcutta being twenty times safer from attack and eighteen times securer from death than the uninoculated should cholera enter the house. This is protection of a very decided character. No case of cholera occurred among those who subjected themselves to both inoculations.

Arthur Powell ²⁰⁶_{No. 7, '95} furnishes the statistics of cholera in the Kalam, Karkuri, and Degubber tea estates since the inoculations were commenced,—February 9, 1895. No case of cholera has occurred among those who had undergone the second inoculation. Among the uninoculated inhabitants, who numbered 3276, there were 47 cases of cholera, with 20 deaths; among the inoculated, numbering 2936, 3 cases, with 2 deaths. It is very likely that one of these patients died from the perforation of a dysenteric ulcer, since she was suffering from sloughing dysentery a week before her death. The period covered by the statistics extends from the above date to May 28, 1895. The results appear to be favorable, and it is likely that the inoculations will become more frequent.

[Neither of these writers report any experience upon the duration of the protection afforded by the inoculation. This is a matter of great interest and importance.—J. P. C. G.]

Freyrnuth ⁶⁹_{Oct. 25, '94; Nov. 24} has treated three cases of undoubted cholera by the injection of serum from patients who had recently passed through an attack of the disease. Of these three cases two recovered. In the fatal case death was due to a mixed infection, as the bacteriological examination showed. In one case particularly the patient rapidly improved after the injection. The numbers are, of course, too small to base conclusions upon. The serum was used in doses of 10, 30, or even 50 cubic centimetres (2½, 8, or 13 drachms). It was shown to protect guinea-pigs against injections of virulent cholera bouillon. The treatment is easily carried

out, and is without danger. The serum should be taken from those who have had a severe attack of cholera.

Treatment.—Very little worth reporting was published during the year. Neufeld³¹_{No. 51, '94} used methylene-violet during an epidemic with favorable results. He employed hypodermatic injections of from 1 to 3 cubic centimetres (15 to 45 minims) daily of 1-per-cent. aqueous solution, or 0.10 gramme (1½ grains) by the mouth or rectum every three or four hours. The effect on the typhoid condition was marked for some hours after ten or fifteen injections of camphorated ether, even in apparently hopeless cases.

E. B. Fullerton, of Columbus, O.,⁵⁹_{July 6, '95} maintains that quinine by the mouth, in doses of about 10 grains (0.65 gramme) an hour, show the best results yet obtained by any treatment known. He asserts that Koch virtually places it highest of all drugs in its power to control the growth of the germ, and that Graham, who learned this method in the laboratory of that great scientist, demonstrated that in strength of 1 to 2500 to 1 to 1000 it kills the germ in from ten minutes to one-half hour. He further says that by its use not a single death occurred for a period of twenty-six days, with a daily average of 57 patients under treatment, in an epidemic in which 7356 cases were reported, of whom 3800 died, in an outbreak that previously to the commencement of the quinine treatment had developed a mortality-rate of 60 per cent.; and that the same epidemic, in the city of Nashville, Tenn., caused 1000 deaths, but in a Southern penitentiary, with a dietary of fresh vegetables and sauerkraut, under the quinine treatment, there was not a single death.

DISEASES OF THE INTESTINES.

Duodenum.

General Considerations.—Perry and Shaw⁴²⁸_{v. 50, p. 171} have made an exhaustive study of the diseases affecting the duodenum, basing their conclusions on the post-mortem records of 17,652 cases at Guy's Hospital since the year 1826, on numerous museum catalogues, transactions of British medical societies, hospital reports, and medical journals. They give abstracts of 334 cases in an appendix extending over 89 pages. Their results, summarized in a careful abstract by T. N. Kelynack, of Manchester,⁹⁰_{Jan., '96} are worthy of reproduction at some length, and in the following *résumé* the authors' own arrangement of the lesions is adopted:—

Non-inflammatory pouches: Two distinct varieties of pouch are met with. In one the wall of the gut around the sacculus is

either perfectly normal or presents changes, such as thinning or separation of the muscular fibres, dependent upon mechanical distension. In the other the pouch is the result either of antecedent ulceration of the mucous surface or of adhesion of the external coat of the bowel to neighboring structures. Only the former of these is to be considered as of a simple or non-inflammatory nature. Fourteen cases are described. Usually the pouches are single, though in one instance two sacculi were present. They are usually situated close to the biliary papilla, but when above it they are commonly placed just beyond the pylorus. In size the pouch varies, but is usually described as being about "as large as a walnut." The opening from the bowel is commonly free, but occasionally there is a distinct constriction forming a neck. The pouches are lined by normal mucous membrane. In the collected cases the sexes were represented equally. Of thirteen cases in which the age was given, the youngest subject was 34 and the oldest 84. All, with one exception, were more than 48, and six of them were over 70. In no instance does the pouch appear to have given rise to symptoms. In five of the cases some other pathological condition besides the pouch was discovered either in the duodenum or adjacent to it. Two presented duodenal ulceration, one a papilloma, one stenosis of pylorus, and one a gall-stone impacted in the bile-duct. It has been suggested that these pouches may be due to congenital malformation. Such appears to be very unlikely. Probably they are due to an unusual degree of intra-intestinal pressure in this part of the alimentary tube. The pylorus at the upper end probably accounts for this increased tension, since by opposing an obstacle to reflux at the moment when the lower part of the duodenum is contracting, it must cause internal pressure at the upper part to be greater than elsewhere.

Congenital stenosis: This may be partial or complete. When the obstruction is complete life cannot be prolonged more than a few days, persistent vomiting being the prominent symptom. When partial the condition may never be evidenced during life. In complete stenosis either a membranous septum is stretched across the lumen of the gut or the bowel is narrowed, for a longer or shorter distance, by a fibrous stricture. When partial the membranous septum may present a central aperture or have a semilunar appearance, when the opening is situated on one side. Seven cases are described.

Laceration: This is exceedingly rare. Only two instances were met with in 18,000 post-mortem inspections at Guy's Hospital. Nine examples have been collected. In 5 it resulted from being "run over," in 3 it was due to a fall from a height, and in 3

was caused by a direct blow upon the abdomen. The laceration was found three times in the first part and five times in the second part. In the other cases its exact situation is doubtful. In one case, the only instance where laceration was incomplete, the serous coat was intact and a large hæmatoma was formed between the muscular coat and the peritoneum. The patient survived the injury four days. Usually extensive visceral injury occurs simultaneously in these traumatic cases. In the case of a girl, aged 14, who was struck in the abdomen by a swing and where duodenal laceration was the only obvious lesion, death occurred in twelve hours. In three cases the onset of acute symptoms was delayed for several hours. One patient walked home and ate a good dinner. One case is recorded as being possibly due to severe vomiting. It occurred in a boy of 14, and followed overindulgence at a Christmas feast. A somewhat doubtful case of spontaneous rupture is also referred to.

Duodenum in hernial sac: One case has been met with at Guy's where the duodenum was contained in the sac of a large right scrotal hernia, together with portions of omentum, ileum, and colon. Kelynack notes the fact that another such case has been reported to the London Pathological Society. ²⁰⁴⁴_{p.124, '91}

Foreign bodies: A foreign body which has succeeded in passing the pylorus is not likely to lodge in the duodenum unless it is too long to pass round the sharp and unyielding bends which characterize this part of the intestine. Two cases are given where a spoon was found, and one where a mass of hair and string was discovered in the lower part of the duodenum of a girl, who had a similar mass in her stomach, and who died of purulent peritonitis. Among other occasional contents of the duodenum may be mentioned blood in various conditions and gall-stones.

Parasites: An ascaris lumbricoides has been found in the duodenum in two instances at Guy's. A museum preparation at the same hospital shows a duodenum infested with numerous anchylostoma.

Post-mortem digestion: The process is almost always confined to the highest portion of the duodenum, and is associated with a similar condition of the stomach. Such limitation to the part above the biliary papilla would suggest that it is due to the influence of the gastric juice which has passed through the pylorus. Duodenal digestion is much rarer than that of the stomach. It occurs more commonly in children than in adults.

Poisons: The duodenum has been found affected in cases of poisoning by antimony, arsenic, colchicum, oxalic acid, sulphuric

acid, and by a mixture of hydrochloric acid and oxalic acid. Nine cases are recorded.

Congestion, ecchymoses, hæmorrhagic erosions: The duodenum often participates with the stomach in presenting the evidences of congestion in such conditions as heart-failure or hepatic cirrhosis. Ecchymoses are also met with in intense congestion, whether active or passive, and result also from altered conditions of blood, such as in ulcerative endocarditis. Hæmorrhagic erosions appear to be produced by the solvent action of the gastric juice upon portions of the mucous membrane, the nutrition of which has been impaired by submucosal effusion of blood. They occur as shallow ulcers, and are confined to the part of the duodenum above the biliary papilla. They are far rarer than in the stomach. Of the 10 collected cases, 5 were cardiac, 2 associated with granular kidney, and 3 with septic conditions. Judging from post-mortem records, the condition of Brunner's glands attracted special attention between the years 1848 and 1852. They were found enlarged in cholera, typhoid, pneumonia, septic conditions, and in a few other affections. The enlargement appears to be closely related to diseases due to septic organisms. The "shaven-beard" appearance of the duodenal follicles is much less common than in the ileum.

Ulcers associated with tuberculosis: 25 cases have been collected where ulceration of the duodenum was found in association with tuberculosis. In 11 they appeared to be of tuberculous origin. True tuberculous ulceration of the duodenum is almost invariably associated with tuberculous ulceration of the rest of the alimentary tract. In 2 cases softening of caseous deposit in a solitary follicle appeared to have led to the ulceration.

Typhoid ulceration: Only 3 cases are recorded. In 2 the ulcers were small, follicular in character, and less advanced than those lower down in the intestine. In the third case the ulcer was solitary, of the size of a sixpenny-piece, surrounded by a broad, hyperæmic zone, and with a distinct slough in its base.

Anthrax: The lesions of anthrax were met with in only 3 cases. The chief appearances were petechiæ, ecchymoses, localized and diffuse œdema, brown sloughs, but with no evidence of supuration.

Septic ulceration: 21 cases illustrate the association of ulceration of the duodenum with septic processes. The Guy's cases give a ratio of 18 ulcers associated with septic conditions to 52 ulcers from all other causes. Duodenal ulceration is associated with septic states nearly as frequently as it is with burns. In the cases recorded 10 of them presented sloughing conditions of the

skin or cellular tissue: 2 had sloughing bed-sores and 1 a sloughing leg, 3 cellulitis, 1 sloughing scrotum, 2 gangrene, and 1 a carbuncle. Of the remainder the causes were general pyæmia, puerperal septicæmia, otitis media, septic broncho-pneumonia, perineal abscess, perinephritic abscess, hip-joint disease, and empyema. The ulcers were invariably found between the pylorus and the biliary papilla, and for the most part round in outline. Possibly it is to the occurrence of small, septic, petechial extravasations of blood in the duodenal mucous membrane, together with the solvent action of the gastric juice, that we must look for an explanation of these ulcers.

Ulceration in burns: During the fifty years from 1843 to 1892, inclusive, 149 cases of burns are recorded as having been examined in the post-mortem room at Guy's Hospital, and in 5 of them duodenal ulceration was discovered. Unfortunately, it is not generally customary to inspect the bodies of patients dying from the effects of the burns alone. Twenty-nine cases are here recorded. The authors' statistics show that, whilst of persons dying from all causes 0.4 per cent. only are found with duodenal ulceration, no less than 3.3 per cent. of those dying from burns exhibit this condition. Curling, on the suggestion of Bowman, regarded Brunner's glands as the starting-point of the lesion. Hunter thinks some toxic body may be excreted with the bile and lead to duodenal congestion and ulceration. The authors are inclined to believe that the diffuse patchy congestion of the alimentary canal is the predisposing cause, and that the exciting cause is the digestive action of the gastric juice, and they further point out that the fact that the exciting cause can exert its effect only above the biliary papilla is a sufficient explanation of the almost invariable limitation of the ulceration to this part of the duodenum. They believe that the mode of production of ulcers associated with burns is identical with that of septic ulcers, and that the septic condition of the burnt surface is indeed the direct cause of duodenal ulcer. In 29 cases the seat of ulceration was found 22 times in the first part, 4 times in the second, in 2 only in the first and second parts, and in 1 case the exact locality is not stated. In 16 the ulcer was single and in 12 there were 2 or more ulcers. In character the ulcer may be superficial, but is usually deep; it is generally circular, but may be irregular, and in size it varies from one-third inch to one and one-third inches in diameter. Perforation occurred in 7 and hæmorrhage in 13 of the cases. The average length of time after the burn at which patients died from perforation was 11 days, and from hæmorrhage 14.5 days. Of 27 cases in which the sex was ascertained, 18 were females and 9 males.

Ulceration in Bright's Disease: 16 cases are mentioned in which some form of Bright's disease co-existed with duodenal ulcer. In character they are described as shallow and very recent, follicular, punched out, contracting, chronic, exposing the pancreas, with subsequent hæmorrhage or perforating. They were sometimes single, sometimes multiple. Of 12 of the cases, 7 were examples of interstitial, 4 of tubal, and 1 of interstitial and tubal nephritis.

Ulceration in cardiac disease: The Guy's records during a period of more than sixty years afford only one equivocal instance of duodenal ulcer associated with heart disease. The authors consequently found it impossible to agree with Chvostek on this point. Four other cases have been collected and are recorded.

Simple duodenal ulcers: In investigating the records of 17,652 post-mortem examinations at Guy's Hospital the authors find 70 cases in which there was an ulcer of the duodenum, either open or healed. This gives a frequency of 0.4 per cent. of persons dying from all causes. It is, therefore, much rarer than gastric ulcer, which, according to Brinton, is observed in about 5 per cent. of all autopsies. The authors' cases give a proportion of 52 males to 17 females, or, if burns be excluded, 48 males to 16 females,—a ratio of 3 to 1. The total of the collected cases gives 109 males to 48 females, or, excluding burns, of 100 males to 30 females. Thus, whilst duodenal ulcer is three times as common in males as in females, gastric ulcer, according to Brinton, is twice as common in females as in males. Krause has given a result different from the above, in his ratio of 58 males to 6 females. The average age of persons who died directly from the results of duodenal ulcer was 50 years in the Guy's cases and 41.8 in the complete series. Of 70 cases, 9 were fatal by hæmorrhage, 8 by perforation, 3 by the result of cicatricial narrowing, either of the bowel or common bile-duct. In unselected cases hæmorrhage occurs in 13 per cent. Krause gives 33 per cent. Eight instances of cicatrization were noted in the 70 cases, or about 11 per cent.

As regards situation, in 149 cases where this is definitely mentioned, 123 were in the first part, 16 in the second, and 2 in the third part of the duodenum. In 8 instances the ulcers were apparently scattered along the whole length. Duodenal ulcers are thus eight times more numerous in the first than in the second part. Sometimes an ulcer will be situated partly in the duodenum and partly upon the pyloric ring. Of viscera complicated by extension of the ulcer, the pancreas is by far the most frequently involved, though sometimes the base may be formed by the liver, gall-bladder, or colon. In shape the ulcer

is usually circular or oval, varying in size from a sixpenny-piece to a shilling. Usually the ulcers are single, but of 160 cases 14 presented two and 9 more than two ulcers. Sometimes ulcers exist at corresponding points of the opposite walls of the bowel. The etiology of the duodenal ulcer still remains obscure. Circulatory derangements, such as embolism, thrombosis, hæmorrhage, or arterial spasm, may impair the vital resistance of the mucous membrane. Alterations in the blood, as anæmia, or the presence of poisons in it, would have a similar effect. Nervous influences may also possibly lower the vitality of the walls. Mechanical lesions have been suggested as a possible starting-point. The importance of the digestive action of the gastric juice compels recognition, if for no other reason than that the ulcer is almost if not invariably situated in that part of the duodenum which is exposed to the solvent action of this fluid before it is mixed with the alkaline flow from the biliary papilla. The questions that are raised in discussing the etiology of duodenal ulcer are, in fact, similar to those requiring solution in the case of gastric ulcer. It is interesting to note that, of 120 cases of duodenal ulcer, 15 presented concomitant ulcers of the stomach. Of 56 collected cases of perforating ulcer, 42 occurred in males and 14 in females; or, if burns be excluded, the ratio gives 42 males to 8 females. The average age was 35 years, and if only the 34 uncomplicated cases be reckoned the age was 36.7, the corresponding age from hæmorrhage being 43 years. The youngest patient who died from hæmorrhage was 27 and the oldest 61, the corresponding ages for perforation being 17 and 67. The perforating variety of duodenal ulcer occurs most frequently in the first part. Of 51 cases, 48 were in the first, 2 in the second, and 1 in the first and second parts.

As regards position, of 28 cases so reported 19 were anterior, 6 posterior, and in 3 the ulcer affected both surfaces of the bowel. Sometimes these duodenal ulcers lead to the formation of localized abscesses within or behind the peritoneum. Other sequelæ are adhesions, fistulæ, obstruction of intestines or bile-duct, and possibly malignant disease. Often the ulcer may be latent in character. Out of 151 of the collected cases no less than 91 presented no noticeable symptoms until death or until the accident of hæmorrhage or perforation led to the fatal issue. In but few instances was there localized pain. Of 23 hæmorrhagic cases 9 patients had hæmatemesis, 9 had melæna, and 5 had both hæmatemesis and melæna. Of 52 of the perforating cases 27 were entirely free from marked symptoms until the occurrence of perforation. The records of 5 cases are given which afford considerable ground for

the supposition that a duodenal ulcer, at first simple, may become the seat of malignant growth.

Inflammatory sacculi: These may result either by the traction of adhesions connecting the bowel to neighboring parts or by the yielding of the base of an old ulcerated area. The latter is at once distinguished by the character of its lining, which may be formed either by scarred and ulcerated mucous membranes or by inflammatory fibrous tissue. The former variety may be conveniently termed "retraction sacculi." They resemble the non-inflammatory pouches above mentioned, in possessing a lining of mucous membrane, but differ from them in the presence of external adhesions.

Fistulæ: Communication between the duodenum and gall-bladder is not uncommon as the result of gall-stones. Several good examples are described. Two cases are recorded where the communication was with the colon.

Duodenal obstruction: The authors have found the records of 33 cases of obstruction of the duodenum, 17 being among the 17,652 autopsies at Guy's. Of these, 14 were examples of internal constriction and 19 of external compression. The internal causes were as follow: Congenital septa, 4; contracting simple ulcer, 6; and carcinomatous stricture, 4. The external compressions were: From peritonitis, 2; pancreatic cancer, 5; cancer of liver, 1; adhesions about gall-bladder, 4; growth, 4; blood-clot, 1; aneurism, 1; and kinking, 1.

Growths: Innocent growths are very rare in the duodenum. Among the records of about 18,000 autopsies at Guy's there are reports of 10 cases of primary malignant growth,—4 carcinomata and 6 sarcomata. Together with collected cases, a total of 22 primary malignant growths are described,—13 carcinomata and 9 sarcomata. Secondary deposits of malignant growths are very rarely observed in the duodenum. The authors record a small number of well-marked examples.

[The value of this communication to the study of duodenal ulcers can hardly be overrated.—J. P. C. G.]

Compression of the Duodenum.

The symptoms resulting from compression of the duodenum are discussed by A. Brou, ²⁰⁰⁰₉₆ according to whom displaced organs, neighboring tumors, or peritoneal adhesions may cause such pressure upon the duodenum as to give rise to temporary or permanent signs of obstruction. This obstruction, if complete and left to itself, ends fatally. There are two prominent symptoms of the condition,—vomiting (almost always incoercible and bilious) and

alternating constipation and diarrhœa. The stomach is also the seat of dilatation, more or less severe. These signs will aid in the diagnosis, but only surgical intervention can verify it, and usually this becomes necessary.

Ulcer of the Duodenum.

Simple ulcer of the duodenum is probably of more frequent occurrence than is usually supposed, examination of the duodenum at autopsies being often omitted. In 52 unselected post-mortem examinations in Letulle's service, ¹¹⁵³_{Oct. 20, '04} ulcerations of the duodenum were met with in 4 instances. The author, from a study of the literature, finds that in the large majority of cases simple ulcer is situated on the first four or five centimetres of the duodenum. In 262 published cases, 242 were found with the ulcer placed less than five centimetres from the pylorus; in 14, in the descending portion; in 3, on the preaortic portion; and also in 3 in the ascending part. These figures would clearly show duodenal ulcer to be essentially a juxtapyloric lesion.

As regards number, duodenal ulcer is almost always single. Collin, ²⁰⁰⁰_{'94} in his collected 233 cases, found a solitary ulcer 195 times,—that is, in a proportion of 83.6 per 100.

In form the simple ulcer of the duodenum is usually round. Sometimes, however, it is oval, angular, or even irregular. In size it is most variable. Generally, the ulcer is more or less perpendicular to the walls of the intestine. When the ulcer is very chronic, the cicatricial contraction occasions considerable deformity of the adjacent parts. Extension to the neighboring arteries appears to occur in the following order of frequency: the pancreatico-duodenal, the right gastro-epiploic, the hepatic, and then the pancreatic artery. Involvement of the veins also sometimes occurs, though rarely, such as the portal and the superior mesenteric. Perforation is the complication most to be dreaded. Collin found that in 262 cases perforation occurred 181 times,—that is, in 69 per cent. Perforation is most frequent when the ulcer is situated in the first portion of the duodenum, and on its anterior wall. In 111 cases in which the seat of the perforating ulcer was noted, in 68 it occupied the anterior surface of the duodenum. Such a fact must prove of considerable interest to the physician and of great practical importance to the surgeon. When perforation does not lead to acute peritonitis, it is usually found that the base of the ulcer is closely adherent to adjacent organs,—to the pancreas most frequently, but sometimes to the liver and gall-bladder. Among the terminations of duodenal ulcer, cicatrization, leading to pyloric obstruction and consequent gastro-ectasis, is of

considerable clinical importance. Sometimes, also, obstruction of the bile-duct and pancreatic duct may result.

G. G. Burdick, of Chicago, ⁷⁷⁹_{Jan., '95} observed a case of duodenal ulcer in a domestic, 22 years of age, in which perforation occurred without any history of previous disturbance, death taking place five days after the first attack of pain. A similar instance is recorded by Burdet, of Lyons, ²¹¹_{June 16, '95} death following an intestinal hæmorrhage without any symptoms whatever of ulcer during life. In a case seen by George P. Biggs, of New York, ⁵⁹_{Aug. 3, '95} pain was first noted in the umbilical and epigastric regions; so that appendicitis was diagnosed. At autopsy an intense peritonitis was seen to be present, and the lower end of the duodenum was dark and almost gangrenous. An ulcer, situated in the extra-peritoneal portion, had caused extension of the inflammation and general peritonitis. Sheild, of London, ⁶_{v.1, No. 19, '95} in reporting two fatal cases in which an operation was also performed, as in Biggs's case, with the expectation of finding the source of trouble in the appendix, concludes as follows: 1. That in perforative peritonitis there is nothing to point to the duodenum as the site of the lesion unless it is clearly made out that the onset of pain was in the epigastrium or right hypochondrium, or that previous epigastric symptoms, as pain and vomiting, had occurred. Great care should be taken in the investigation of this part of the history, which is most vital and important. 2. That, considering the frequency of duodenal ulcer in males, the possibility of this affection should always enter the minds of surgeons who are called to a case of perforative peritonitis occurring in a man. 3. That the non-feculent and sometimes acid nature of the extravasated fluids and gas may serve as a most important diagnostic aid, and the incision may be made small as an exploratory effort only until this vital point is made clear. When once the surgeon has made up his mind that the exudation is non-feculent, and especially if it be acid, the region of the stomach and duodenum should be explored without loss of time. The nature of the fluid is a matter for future observation.

Two cases of round ulcer of the duodenum are described by W. Heintz. ⁵⁸⁶_{Nos. 37, 38, 39, '94}

Cancer of the Duodenum.

According to Pic, ⁹²_{Jan., '95} ⁹⁰_{May} primary cancer of the duodenum has, in the great majority of cases, an annular form, and thus most frequently produces stenosis, the stenotic symptoms varying according to the level at which the growth occurs. Above the ampulla of Vater the neoplasm develops in the first portion of the duodenum and presents a symptomatology almost identical to that

of pyloric cancer. In that below the ampulla, besides the symptoms accompanying stenosis of the pylorus, there are signs indicating a reflux of bile and pancreatic juice into the stomach, while in that developing about the ampulla the symptoms approach more or less one or the other of the above forms. Among the periampullar cancers the author groups not only the cancers of the duodenum which affect the ampulla of Vater, but those situated in the neighborhood and those which, in their development, involve the ampulla. Some of these cannot be distinguished clinically from the ordinary examples of duodenal cancer, but some may be distinguished by their resemblance to pancreatic carcinoma. Pathologically, these growths usually present narrowing or contraction of the gut at the level of the cancer, with dilatation above it, sometimes involving the stomach itself, and frequently accompanied by insufficiency of the pyloric valve. Histologically, there appear to be as many varieties of cancer of the duodenum as there are different kinds of cells entering into the formation of this segment of the digestive tract. In the form situated immediately beyond the pylorus, diagnosis is usually impossible, but in other situations it is sometimes possible. Primary duodenal cancer must be differentiated from supra-duodenal, or pyloric stenosis, and infra-duodenal stenosis, and conditions of constriction dependent on extrinsic causes, such as compression by surrounding structures. The topographical diagnosis is of the greatest importance from the point of view of operative interference, which differs according to the seat of the growth in the duodenum. When diagnosis is impossible, exploratory laparotomy constitutes the first measure necessary for surgical intervention, which, however, in the greater number of instances, cannot be more than palliative. A case of duodenal hæmatoma simulating internal strangulation is described by Balster.⁴

Dec. 17, '94

Rupture of the Duodenum.

Taylor, of Dublin,¹⁶ June, '96 describes a fatal case of retroperitoneal rupture of the duodenum in a drayman who was crushed between the point of the shaft of his own dray and the projecting hinder end of the shaft of another dray, as he was walking backward. The duodenum lay just behind the point struck. Wagrowski⁵²⁰ No. 1, '96 relates a similar fatal case, in a boy of 16, crushed between the arm of a crane and a wall.

Vermiform Appendix.

General Considerations.—Cavan and Barhart, of Toronto,³⁹ Mar., '96 agree with Clado that the appendix is kept in place by two folds

of peritoneum,—a meso-appendix attached to the iliac fossa, and perpendicular to this a fold attached to the posterior part of the ileum. There is, however, considerable variation in the length, position, and attachment of these folds. In the female a double fold of peritoneum runs from the root of the appendix to the ovarian ligament. The authors also observed a corresponding fold from the colon on the left side. Contrary to the statement of Treves, they assert that the appendix is never absent, though it sometimes requires careful examination to discover it. The researches of Hadley Williams⁹ May 4, '95 led him to believe that the development of the alimentary canal readily explains abnormal positions of the vermiform appendix. At the twelfth and sixteenth weeks there seems to be no difference in size between the base of the appendix and the cæcum. Prior to the sixth and seventh months both lie well up in the abdomen, behind the liver or median line. The appendix is nearly always found covered by peritoneum, and in most cases is possessed of a mesentery and a well-marked muscular circular coat. The appendicular artery lies behind the distal portion of the ileum, and is accessible to pressure. The wall of the appendix is always formed by the anterior band of muscular fibres from the cæcum, and from its position in a pocket-like cavity it is accessible to pressure from an impacted large bowel. Fæces collected in the lumen of the appendix do not necessarily set up any pathological disturbance. Air or fluid injected into the large bowel invariably rotates the cæcum outward, in close relation to the antero-superior spine and crest of the ilium, the appendix being often dragged into abnormal positions and twisted on itself. When ulceration takes place, with extra-peritoneal formation of pus, two layers of serous membrane are involved if the appendix be intra-peritoneal. Anatomically, it is quite possible for pus to separate the layers of the appendicular mesentery.

Appendicitis.

R. T. Morris, of New York, ¹ Feb. 23, '95 showed to the Philadelphia County Medical Society specimens illustrating each step in the progress of infectious appendicitis. He believes appendicitis to be an infective exudative inflammation of the appendix vermiformis, following the production of an area of infection of any sort in the mucosa or in the peritoneal covering of the appendix. When such an area is produced, bacteria at once enter the lymphoid structure and the cellular coats, the stage of exudation begins, and the tissues are compressed by the exudate. There is no doubt that in the majority of cases there is compression by an exudate

which has a tendency to destroy the lymphoid tissue and mucosa, which are confined within narrow limits. In the colon, when infection begins and exudation takes place, there is abundance of room for swelling, and the interstitial exudation does not lead to compression and anæmia. In the narrow appendix there is not room. The lymphoid tissue cannot act as a filter for the bacteria, and the elements forming the inner tube are compressed to the point of strangulation in many cases; if not, compression anæmia is produced, allowing of more rapid toxic destruction of the cells, and the toxins produced by the bacteria which have entered the infectious area cause destruction of the cells before nuclein can be poured out and the leucocytes do their work. Thus there is frequently rapid destruction of the mucosa and lymphoid tissue which should act as a protecting coat, but which, being compressed, are destroyed and become a prey to bacteria. Proliferative endarteritis begins very early, and this occurs in a small terminal artery; for, practically, the only arterial supply of the appendix is from a solitary terminal artery. If a branch of the artery become occluded, a round punch-hole slough forms at the point supplied by this branch. If more of the artery become obliterated there is frequently complete gangrene of the appendix. Only a few hours are required for an obliterating endarteritis to become sufficiently marked to lead to destruction of all parts not supplied with blood by bacteria ready to pounce upon such parts. Usually in the very early stage of the infection there is a mixed infection. Streptococci are apt to be present, and these with other bacteria cause elevation of temperature, whereas when the infection is from the colon bacillus the temperature is not apt to be high, but about 100° to perhaps 101° F. (37.8° to 38.3° C.) during a most violent attack of infective appendicitis going on to death. This statement in regard to temperature the speaker was almost prepared to make as a positive one, but he would wait for more observations before asserting that a high temperature indicated streptococci or mixed infection, and that a low temperature indicated a colon-bacillus infection. He was almost certain, however, that the toxin of the colon bacillus did not cause the temperature to rise.

Walker Schell ¹_{Apr. 20, '95} has had the opportunity of examining the appendix in one or two cases of the early stages of the disease, and states that the destructive changes began in the tubular glands which are so abundant in this region, and that through the ulcers thus produced the infective material evidently gained access to the lymphadenoid tissue placed beneath; and in this suppuration occurred and extended laterally under the mucous membrane beyond

the original superficial lesion. It is thus easy to understand how stenosis and contraction of the lumen of the tube are produced in cases which recover.

Pilliet and Coste, of Paris, ⁷_{Jan., '95} give the results of an exhaustive microscopical examination of ten appendices removed on account of the train of symptoms occurring in chronic relapsing appendicitis. According to the results in their examination, the name follicular appendicitis would be anatomically correct, since the follicles are invariably affected as well as the mucous glands.

J. Chris. Lange ⁷⁸⁶_{Mar., '95} considers that the foreign-body theory, as the origin of this affection, cannot now be maintained, since it has been shown that faecal concretions are so commonly observed in healthy individuals. Torsion of the process, bringing about arterial or capillary thrombosis and a resulting diminution of the vitality of the walls, together with infection by the bacillus coli communis, are looked upon as the direct causes of appendicitis.

In forty-six cases examined by Cavan and Barhart ³⁹_{Mar., '95} faecal concretions were present without any signs of damage to the organ. In only one case was a foreign body observed, that being a pin. The authors, therefore, regard it as doubtful that foreign bodies and concretions cause necrosis and so excite inflammation with perforation, though they may modify the tissue to such an extent as to permit of the lodgment of micro-organisms.

In a case under the care of McPhedran and Cavan ³⁹_{Mar., '95} a pin was found, post-mortem, lodged in the appendix of a patient who had died of pyæmia. No signs of recent inflammation were present, but there had evidently been a good deal of old mischief lighted up by the intruder, since the walls were thickened and constricted. Several similar cases of the discovery of foreign bodies in the appendix have been recorded. Thus, Roswell Park ⁵⁹_{Mar. 10, '95} reports two cases in which appendicitis was lighted up by pins within the lumen of the process, and which were cured by operation.

A fatal case of perforation of the appendix by a pin is recorded by P. A. Colmer, of Yeovil, ²²_{Oct. 17, '94} and one by J. W. Kales, of Franklinville, N. Y., ⁵⁹_{Apr. 6, '95} in which apple- or pear- seeds were found, at autopsy, perforating the appendix. McBurney ⁵⁹_{Mar. 30, '95} also found two grape-seeds in a healthy appendix of a patient on whom he was operating for an abdominal tumor. Although no symptoms had been caused, he took the opportunity of removing it.

Damaye ¹⁴_{Feb. 27, '95} found little or no superficial sign of alteration in the organ in two cases operated on by Schwartz for recurrent appendicitis. He insists on the fact that the symptoms give no idea

of the gravity of the lesions, for often the patient shows every sign of health, although the organ may be much diseased.

The evidence in a few cases in which foreign bodies have been found goes to show that the appendix will tolerate their presence without any symptoms necessarily arising. At the post-mortem examination of a case recorded by Warren Coleman, of New York, ²²_{Aug. 21, '95} on cutting into the enlarged end a fragment of bone, one extremity of which was rounded, was found. This foreign body measured five-eighths of an inch in length and one-fourth of an inch in circumference. It had entered the appendix blunt end foremost and had traveled up as far as it could go. The piece of bone was entirely surrounded with mucus, and the lumen of the appendix was entirely filled by it. The appendix itself had a mesentery which extended nearly half of its length. No signs of any inflammation were present, either within or outside the appendix, and no fecal impaction had taken place. Reasoning from this evidence, so far as it goes, it would seem that something more than an extraneous substance in the appendix was necessary to produce appendicitis.

G. Rochaz, of Lausanne, ¹⁹⁷_{Dec. 20, '94} in discussing the origin and nature of concretions found in the appendix, states that they are always formed in the appendix itself and are usually single. Their general shape is elongated, their color brownish, and their consistence as often hard as soft. They are frequently laminated and the nucleus is generally lighter in color than the envelope. Chemically they are very similar in nature to human feces. They are more frequently present in men than in women and are not induced by constipation. Changes in the normal shape and position of the appendix, induced by strictures and adhesions, seem to be responsible for their formation in the majority of cases.

G. A. Sutherland ⁶_{Aug. 24, '95} states that, while appendicitis is usually regarded as a purely local condition dependent on such causes as catarrh, concretion, cystic dilatation, a kink or twist, etc., it is possible that its tissues can be so acted upon by a toxic agent circulating in the blood as to become the seat of acute or chronic inflammation. He attempts to show that rheumatism may thus act as an etiological agent. The appendix has been spoken of as "the abdominal tonsil." There are many points of resemblance, both anatomical and pathological, between the tonsils and the vermiform appendix. If the tonsils are to be considered "the first line of defense in the alimentary canal," the author thinks "it may not be amiss to regard the vermiform appendix as the second line of defense." The irritant poison of rheumatism not infrequently leads to inflammation in certain susceptible tissues.

Sometimes the inflammation attacks primarily the tonsils, extending thence to the pharynx, soft palate, and the deeper structures of the neck. "Similarly, in the case of appendicitis, we may have a constitutional poison manifesting itself by an inflammation of the lymphoid tissue in the appendix, and an extension of this inflammation to the mucous membrane, the adjacent peritoneum, and the cæcum." Cases of appendicitis associated with rheumatism being rarely recognized as such, the two cases recorded by W. H. Brazil, of Bolton, ^{May 26, '96} are of interest and point to some relation between the two diseases. In both there were severe pain and tenderness at and around McBurney's point, with general manifestations of rheumatism which in no way yielded to measures calculated to overcome the local disorder. The remarkable similarity of structure between the vermiform appendix and the tonsil, together with the well-known liability of the latter organ to rheumatic inflammation, would lend support to the view.

Two cases, occurring in a family with numerous manifestations of rheumatism, seem to J. E. Blomfield, of Sevenoaks, ^{Sept. 14, '96} strongly confirmative of the rheumatic or catarrhal nature of many cases of appendicitis; but the differential diagnosis of such from the forms due to ulceration and perforation or sloughing of the appendix is a matter of considerable difficulty.

G. Armstrong Atkinson, of Newcastle-on-Tyne, ^{June 29, '96} raises the question of heredity in appendicitis, in view of the hereditary tendency of lymphoid tissue to become inflamed, and of the large amount of lymphoid tissue in the appendix predisposing to inflammation of its lining membrane. There is, he believes, much truth in the idea which regards persons liable to sore throat, and overgrowth of lymphoid tissue there, as liable to appendicular mischief, and tendencies to throat affections of this nature are certainly hereditary. The following cases, occurring in one family in his practice, are, in this connection, worthy of note. The father, whose family history was good, died from diabetes mellitus when the youngest patient was 14, and suffered for many years from repeated attacks of what was apparently appendicular colic, but no post-mortem examination was allowed. The mother is a healthy woman, but one of her sisters and one of her brothers died from phthisis and a child from tuberculous meningitis. The three patients now to be mentioned were fairly strong adolescents, without any rheumatic tendencies, living in a large house in comparative luxury: C. Y., an athletic young man, aged 24, frequently has had simple pharyngitis; a severe attack of appendicitis, followed by slow convalescence, occurred in October, 1892. P. Y., brother to the above, aged 21, also liable to pharyngeal catarrh.

A moderately severe attack of appendicitis occurred in July, 1893. M. Y., sister to the foregoing, aged 21, has enlarged tonsils, and frequently pharyngitis. At the time of report was convalescing from a comparatively mild appendicitis.

The question of heredity receives further illustration in the following cases, recorded by Henry Taylor, of Guildford ²_{Oct. 19, '95}: Out of a family of four sons and one daughter the second son died of acute general peritonitis, which was shown, by examination after death, to have resulted from a perforating ulcer of the vermiform appendix. He had had several previous attacks of what was supposed to be typhlitis, due to his habit of chewing wheat while exercising his calling as a miller. The youngest son, also a miller, had a severe attack of appendicitis, followed by iliac abscess, which relieved itself by bursting into the rectum. The daughter, a single woman, has had two well-marked attacks of either typhlitis or appendicitis, from which she made good recoveries. Lastly, an elderly woman, a cousin of the above, died of acute peritonitis originating in inflammation and probable perforation of the appendix.

According to J. Ernest Frazer, of Ventnor, ²_{July 27, '95} the heredity lies in the tendency to the development of the predisposing condition,—uricacidæmia (Haig) or uricæmia (Sir Dyce Duckworth). When there is an excess of uric acid or urates in solution in the circulating blood, it is a necessary consequence that deposition, when it occurs, should also be in excess, and this excessive deposit is more likely than a smaller one to produce excessive symptoms referred to the seat of excessive deposition.

Churton ²_{Jan. 26, '95} saw a fatal case in a child of $2\frac{1}{4}$ years, previously healthy, but injudiciously fed. At the autopsy the following condition was noted: Perforation of appendix half an inch from tip. Thick inflammatory mass lying between ileum and cæcum. Small intestine normal size for first five feet, last two feet forming a loop gently adherent to right wall of pelvis; mucous membrane quite smooth for half an inch at point of kinking and obstruction; above and below valvulæ conniventes conspicuous. Intermediate intestine distended; contiguous coils adherent by butter-like, inflammatory material; no general peritonitis. Death had resulted from the obstruction.

G. H. Thompson, of St. Louis, ¹¹⁴⁴_{July, '95} attributes the origin of a case seen by him to constipation.

Mayet, of Paris, ¹⁴_{Feb. 27, '95} describes a case of appendicitis simulating a perinephritic abscess, and Atherton, of Toronto, ³⁹_{Mar., '95} a case complicated by such an abscess.

Achard ¹⁰⁰_{Nov. 20, '95} reports a case of suppurative hepatitis consecu-

tive to appendicitis. A diagnosis of perihepatitis had been made during life, and, as the colon bacillus was found in the pus removed by exploratory puncture, the pericæcal origin of the suppuration could be almost affirmed before death. The case proved, upon post-mortem examination, to be one of areolar abscess developed about the subhepatic veins,—a comparatively rare condition, which appears to be more likely to occur in subacute forms of appendicitis.

Berthelin²⁰⁰⁰_{'96} remarks that hepatic complications are most frequent in youth and in the latent form of appendicitis. The liver may be infected by extension of the septic area or by the intermediary of the cellular tissue of the iliac and lumbar fossæ; but, contrary to Körte's opinion, infection occurs most frequently through the portal system, the lymphatics playing but a secondary rôle. The condition of the appendix, when the liver becomes involved, is serious, ulceration and perforation being present. It is in cases in which the appendix is partially sphacelated and confluent with the abscess-walls that the venous lesions may be most easily followed from the appendicular origin of the portal system.

A. P. Ohlmacher, of Cleveland, Ohio,²²²_{Sept., '94} reports a case of appendicitis complicated with inguinal hernia, in which an operation was performed by Fenger, and the pus found to be in a sac surrounding the cæcum. From this pus a pure culture of a facultative, anaërobic, liquefying, motile bacillus of the proteus group. From inoculation experiments, it is clear to the author that this bacillus, rarely found outside of a saprophytic existence, may, in the event of suitable changes of environment, assume highly parasitic and pathogenic characters.

Psoïtis of appendicular origin is the term applied by Couraud²⁰⁴⁵_{'94} to inflammation in the ileo-psoas after inflammation of the appendix or cæcum. The chief sign of the condition is flexion of the right thigh, sometimes of both thighs, on the pelvis, with or without inward rotation, with or without pain on extension, with irradiations of such pain as far as the false ribs and the loins, which have a bruised feeling.

A case of cylindrical epithelioma of the cæcum and appendix simulating recurrent appendicitis is recorded by G. Sourdille, of Paris.⁷

Berger,²⁴_{June 16, '96} considers the subject of recurrent appendicitis in a clinical lecture.

An endothelial sarcoma of the vermiform appendix was found post-mortem by L. W. Glazebrook, of Washington,⁸¹_{May, '95} in a patient who had died from cerebral hæmorrhage.

Maurice Letulle, of Paris,¹¹⁵³_{Apr. 13, '95} remarks that acute perforation

of the small intestine is a subject somewhat overlooked during the numerous researches now being made on appendicitis. He divides the causes of perforating ulcers of the small intestine into two distinct groups: in the first, typhoid fever (an extremely frequent cause) and tuberculous enteritis (much more rare) lead to perforation not far from the ileo-cæcal valve; in the second, a series of ill-determined causes, from ulcerations of the mucous membrane of the digestive tract following gastro-intestinal uræmia to the so-called simple acute ulcers of the small intestine occurring in a perfectly healthy individual, and attributable only to foreign bodies. In a case seen by Letulle laparotomy failed to reveal the site of ulceration and the patient died. In view of this fact, he suggests that, in performing laparotomy for a perforative peritonitis, the surgeon should proceed exactly as if performing an autopsy on a living subject, without neglecting the smallest detail. In this particular case, diagnosed as appendicitis with localized peritonitis, a recurrent juxtapubic pain should have attracted the attention of the surgeon and guided his hand, while it should also have led him to temporize a little longer. In many instances, a day longer for the formation of inflammatory adhesions prevents secondary infection and aids in assuring, if not absolute recovery of the patient, at least, cure of the purulent collection by operation.

Barbe²⁰⁰⁰₉₅ calls attention to latent forms of perforation of the small intestine, in which the ordinary symptoms do not appear or are subordinate to those of intercurrent affections. The most frequent signs in such cases are pain, lowered temperature, vomiting, constipation, and dilatation. The diagnosis is difficult and must be made early, in order to insure benefit from the treatment, which consists in operation with rigorous antisepsis.

J. L. Heffron, of Syracuse, N. Y.,⁵⁹_{Oct. 6, '94} states that right-sided abdominal pain, increased by motion and by pressure, with tenderness on pressure most intense over the origin of the appendix, with vomiting, and some disturbance of the circulation and temperature, coming on suddenly in a person previously healthy, are sufficient to establish a diagnosis of acute appendicitis.

Treatment.—The discussion as to the relative merits of medical and surgical treatment in appendicitis is still being carried on, and a solution of the question cannot yet be definitely arrived at. Among French authorities, Talamon³¹_{Nov. 24, '94} protests against the tendency to operate, believing that 75 per cent. of the cases are not amenable to surgical measures. He asserts that, at least in three classes of the disease, the treatment should be purely medical,—viz., in appendicular colic, in parietal appendicitis, and in appendicitis with partial sero-fibrinous peritonitis. The consensus

of opinion of the members of the Société des Hôpitaux of Paris is that surgeons generally have, during recent years, shown a too marked tendency to operate. In the discussion of eleven cases medically treated by Millard,³_{Nov. 28, '94} in all of which recovery took place, le Gendre, Sevestre, Moizard, and Mathieu deprecated the use of purgatives in appendicitis. On the contrary, the patients should be completely immobilized, as it were, and large doses of opium or morphine administered without fear. Purgatives should be given only when the local symptoms show less intensity, and when the danger of perforation and generalized peritonitis is less. Time should be allowed for the formation of protecting adhesions, which prevent the entrance of pus into the peritoneal cavity. Purgatives, when used, should be very mild, preference being accorded to castor-oil, the action of which can be regulated by giving teaspoonful doses. The first day of purgation but one teaspoonful should be administered; later on several such doses may be given in a day, one at a time, an hour apart. In continuing the discussion on the same subject, Rendu,³_{Dec. 12, '94} stated, as the result of his observations, that the immense majority of cases of perityphlitis in the adult recover under medical treatment, without any necessity for surgical measures. Appendicitis, especially in children, is much more grave, but it is rarely that death results from the first shock which follows intestinal perforation. It is usually within the five or six days following, when there is an abatement of the symptoms, leading one to suppose that convalescence has set in, that the patients succumb to unexpected symptoms. Medical treatment should therefore be begun at once, and the surgeon should not be called in at the first appearance of peritoneal symptoms, but only when a purulent encysted collection is definitely ascertained to be present. The speaker alluded to the statistics given by Mathieu, showing that even in England, where surgical measures are so boldly undertaken, the plan of medical treatment in these cases is steadily gaining ground. Ferrand, in closing the discussion, called attention to a point in regard to the administration of opium,—a drug which had been advised by so many of the members participating in the debate. Without disputing its value, he believed that opium diminished intestinal secretion and favored, to a certain extent, faecal stasis, the consequences of which are so disastrous in some cases of typhlitis. Belladonna, it seemed to him, might be substituted for opium with advantage. He had so little fear of intestinal movements, in these cases, that he did not hesitate to give injections of senna when necessary. In spite of the colic which these occasion, they have the great advantage of assuring asepsis of the intestinal canal.

Léon Joubert ⁶⁷³_{June, '95} gives interesting details of three cases cured by rectal injections of glycerin in large doses. He is firmly convinced that this remedy should be employed in every case before attempting laparotomy,—an operation less dangerous, it is true, in these days of antiseptis, but often impracticable in the country, in the colonies, or at small military camps, where the physician finds himself without assistants or without the necessary armamentarium.

Beverly Robinson, of New York, ⁵⁹_{Sept. 14, '95} in a paper on rheumatism as a cause of appendicitis, affirms that treatment with salicin, or the salicylates, in sufficient and frequently repeated doses, has, in his experience, diminished pain and inflammatory manifestations in the appendicular region more frequently than any other routine method of treatment. In many cases he is thoroughly convinced that suppuration has been mainly avoided by this means. Not that other remedial measures of a suitable kind should not be instituted. Among these he places, as very important, liquid or low diet and relative rest. In very acute cases, with pronounced fever and vomiting, entire rest in bed and solely liquid diet are, naturally, imperatively required. In these instances, moreover, he would insist, in the beginning, upon the local application of poultices or the ice-coil or ice-bag. He usually prefers repeated poultices as more suitable to resolution of rheumatic inflammation, and relies upon moderately large laxative enemata to free up constipated bowels in persons who have very marked general reaction. In numerous instances he is equally unsatisfied, where the general reaction is not so pronounced, that a mercurial in the form of 6 or 8 grains (0.39 or 0.52 gramme) of gray powder, or an equal dose of blue mass, serves a better purpose. It does not increase the danger to the patient through the peristaltic action of the bowels, while it promotes the flow of bile, which, in more ways than one, is directly useful. Of course, in some cases where pain is very severe, anodynes should be resorted to, and in extreme instances of this kind hypodermatic injections of morphine are the final resort; though, like the operation itself, unless obviously called for, it is bad treatment. Morphine, of all drugs, is the one that locks up most rapidly and completely the secretory functions. It is true of the kidneys, the stomach, the bowels, the liver, the respiratory organs. Codeine, which does not have this effect, is equally efficacious in many instances. It does not nauseate or constipate much, as a rule. It does mitigate, and sometimes abolish, pain. It allows time to be utilized so as to use the proper remedial drug,—viz., salicylate of soda,—and thus it guards the patient not infrequently against surgical interference, except

in suitable cases, which is the ruling spirit of the hour, and which he deprecates. Local depletion with leeches or wet cups over the painful region, in patients of full habit, remains at present, as during the past, a proper and judicious abortive treatment of appendicitis.

The treatment recommended by Sahli at the German Surgical Congress ³⁴_{Apr. 16, '95} consists in small doses of opium, a diet restricted to fluids, and the application of an ice-bag. Operation is advised in those instances where, in spite of such measures, the symptoms persist at the end of the third day unchanged or aggravated, although occasionally it may be permissible to maintain expectant treatment till the eighth day. The same treatment is also recommended for relapses or recurrences. Lange ⁷⁸⁶_{Mar., '95} admits that wherever pus exists surgical treatment is required, and then discusses *in extenso* how best to prevent its formation,—viz., by absolute rest of the bowel and antiseptics of the tube. Arrest of peristalsis is obtained by the use of morphine, while powdered charcoal, subnitrate of bismuth, guaiacol, and calomel are relied on to render the bowel aseptic. Purgatives can only do harm.

Walker Schell ¹_{Apr. 20, '95} considers that in the simpler cases it is often wise to unload the bowels by the cautious use of an enema, so as to remove irritating ingesta, fermenting intestinal secretions, and fæcal masses. In the more severe cases, however, nothing but harm can follow, since active peristalsis is lighted up, and this tends to break down and tear adhesions, to open perforative ulcers which have been closed by inflammatory lymph, and to spread infection by the movement of the intestines. G. E. Clark, of Skaneateles, N. Y., ²⁰⁰³_{Oct. 16, '94} is an advocate of hydrotherapy in the treatment of the disease.

According to Schäfer, of Leipzig, ⁶⁹_{No. 14, '95} as soon as the first precursors of perityphlitis have made themselves manifest in a child, there should be no delay in quieting the bowel with opium, and, if necessary, by heroic doses; an ice-bag should be placed over the ileo-cæcal region, and an absolute milk diet should be given by teaspoonfuls, cold. Special care in diet is demanded during convalescence, as the severe symptoms may readily be recalled by the slightest error. For this reason the avoidance of solids is indispensable in children who have already had perityphlitis. The medical treatment of the disease is discussed in papers by Tusa, ⁹⁹⁶_{Aug. 25, '95} Bønning, ¹⁸⁵_{Nov., '94} Heffron, ⁵⁹_{Oct. 6, '94} Brooks, ¹²¹_{Feb., '95} Caley, ¹⁵_{p. 138, '95} and Aufrecht, ¹¹⁶_{May, '95}

[The opinions of the authors quoted show the swing of the pendulum which was bound to take place. Surgeons in giving their opinions are sometimes apt to forget that their experience deals largely with the cases in which not only the diagnosis of

appendicitis has already been made by the medical attendant, but also the opinion reached that operative interference was demanded. The large number of cases in which recovery follows purely medical treatment does not come under the surgeon's observation. By this criticism I by no means intend to undervalue the importance and imperative need of operative interference in very many cases. My purpose is simply to point out the fact that there is a growing opinion that this interference may be, and often is, pushed too far.—J. P. C. G.]

Morning Diarrhœa.

Francis Delafield, of New York, ⁵⁹_{May 11, '96} applies the term "morning diarrhœa" to cases having one or more loose passages of fluid and fæcal matter from the bowels during the morning hours. This condition is not fatal and the lesions, which can only be surmised from the symptoms, are located in the colon, and consist of an exudation of serum from the blood-vessels, a morbid change in the functions of the mucus-producing glands, a productive inflammation in some cases, and no structural change in others. There are no satisfactory reasons for the occurrence of the diarrhœa. The discharges are of large size, brownish in color, and composed of fluid mixed with fæces. They may be offensive, and are frequently accompanied by the escape of wind. Five varieties are mentioned: first, those in which there is a single loose movement every morning after breakfast; second, those in which there are several loose movements after breakfast; third, those in which the loose passages commence at 4 or 5 o'clock in the morning; fourth, those in which a movement of the bowels always follows the taking of food; and, fifth, those in which mucus is occasionally present in the discharges. The third, fourth, and fifth varieties result from the persistence of the first two, and are extremely annoying. Those who have suffered for any length of time, according to J. C. Wise, U. S. N., ⁵⁹_{June 22, '96} present decided evidence of malnutrition and defective hæmatosis: the complexion inclines to sallow, the tongue is lightly furred or gashed, and the appetite is capricious and uncertain. The nervous system is usually involved, sleep is disturbed and insufficient, memory is impaired, and the power of concentration or continued mental effort is diminished. This applies to chronic cases, between which and the acute form there is much variety as to phase and extent. Often a slight, but acute, dyspepsia has preceded, and a tolerance of the symptoms becomes established without cure, the condition resulting in gastric dilatation with defective motility; the food passes the pylorus non-peptonized and uninfluenced by pancreatic digestion, in a septic

and fermentescible state, to induce the symptoms predicted in the lower bowel, where, of course, eventually congestion and perverted secretion result. These conditions, superadded to deficient peristalsis and usually a restricted dietary, occasion ineffectual efforts at evacuation. There are doubtless many cases, especially in city practice, of a more distinctly nervous form, such as are caused by undue fatigue, mental or physical, and in females with neurasthenia of menstrual origin. The chief cause of the condition, in the opinion of L. W. Zwisohn, of New York, ⁵⁹_{July 9, '96} is indigestion, aggravated by cold, anxiety, etc., the five varieties described by Delafield being only degrees of the same affection.

Treatment.—Delafield considers removal to a dry, inland climate, a careful dietary, and occasional lavage of the stomach as the best measures to insure a cure in morning diarrhœa. Arsenic, quinine, ipecac, belladonna, and cannabis are occasionally useful, but the drug which has given the best results is castor-oil, in doses of 5 to 10 drops. He has not found beta-naphthol of value, but Wise finds that it arrests diarrhœa more rapidly than any other drug. Wise states that many cases are benefited by a draught of aperient saline water before breakfast, which insures flushing and thorough evacuation of the bowels. In advanced cases the depletion caused by such treatment must be borne in mind, and for these, as well as others, the best results are obtained from a prolonged residence at the springs, such as Vichy and Kissingen in Europe, the Allegheny Springs (Montgomery Co.) in Virginia, and Saratoga, N. Y. Zwisohn attaches most importance to dietetic treatment.

Simple Colitis.

Ruete and Enoch ⁶⁹_{Dec. 6, '94} describe a fatal case of diarrhœa in which the Finkler-Prior bacillus was found in the stools; but, apart from this, nothing presenting new features as regards the pathology of the disease was reported during the year.

Treatment.—Speaking of milk, which dietetically and in conjunction with rest is of such great value in this disease, George Thin ²_{Feb. 9, '96} states that the quantity necessary to maintain strength is so great that patients find it difficult to carry out the treatment. The amount, he finds, may be considerably diminished by evaporating the milk, using a spirit-lamp to heat it rapidly. It must be stirred continuously after it gets warm and until it has become cold, to prevent a skin forming. If the cream is allowed to come to the top, the milk takes longer to evaporate and the taste is not so good. When the evaporation is properly effected, the cream remains mixed in the milk as usual, but, of course, rises on stand-

ing. The milk should, therefore, be stirred before being drunk. Evaporated in this way, it has a richer taste and looks richer than ordinary milk, but is not unpalatable. It gets sour more quickly than fresh milk. The process consumes a good deal of time and requires constant attention.

In the treatment of chronic forms rest is the first and most important point to be insisted upon, if a cure is to be made. Carpenter¹¹⁹_{Aug. 17, '95} advises rest in bed with gentle massage of legs and arms and a liquid diet. If milk alone is given, the stools must be inspected daily to see that the milk is properly digested.

H. A. Hare, in an editorial,⁸⁰_{Apr. 15, '95} calls attention to the value of rectal medication in diseases in which diarrhœa is a well-developed symptom. The method has the advantage of bringing the medicament near to the seat of trouble and leaves the stomach and upper portion of the digestive tract unimpaired for the assimilation of concentrated nourishment or of such medicines as the general condition may indicate. It is true that the acute diarrhœas of indigestion are more readily controlled by the administration of medicines by the mouth, simply because only a few doses are required, and the patient is generally unwilling to suffer the inconveniences associated with rectal medication, though, if the disease be at all chronic, these inconveniences are so slight that, for the sake of relief, he gladly puts up with them.

Aside from the administration of opium and astringent substances by means of suppositories or small injections, Hare believes that large rectal injections, or injections of sufficient size to wash out the sigmoid flexure and colon, are not sufficiently resorted to, particularly in those cases of diarrhœa in which a catarrhal element is well marked. In these catarrhal cases it will generally be found that, mixed with the watery portion of the discharge, there is more or less mucus in strings or flakes, which indicates, as a rule, that a certain amount of the trouble, at least, is situated in the colon. While the rule is by no means an absolute one, the presence of large quantities of mucus indicates very strongly that the whole trouble is in the larger bowel. It is evident, therefore, that the use of drugs by the mouth is a very indirect way of influencing the diseased area. On the other hand, good results are attained if large clysters are given by means of an hydrostatic syringe elevated not more than eighteen inches or two feet above the rectum. Such treatment will frequently control the movements, limiting them to one or two in twenty-four hours, even if the fluid character of the stool remains unchanged. Various substances have been employed dissolved in the water to be injected. Some of them have not only a powerful local action, but, in ad-

dition, are capable, on absorption, of producing wide-spread influences throughout the body. Among these may be mentioned salicylic acid and its relatives, nitrate of silver, iodoform when given in oil emulsion, and some of the vegetable astringents. The substance which has always given him the best results under these circumstances is the sulphocarbolate of zinc in the proportion of 10 to 30 grains (0.65 to 2 grammes) to an injection amounting to from 2 to 3 quarts (litres). In some instances the water should be tepid, in others it should be as hot as the bowel can stand, and in still others it should be quite cold, the temperature of the injection depending largely upon the acuteness of the inflammatory process and the sensations of the patient. If the water be cold, care should be taken that undue chilling of the body does not result in feeble persons, or if hot, on the other hand, that a mild degree of heat fever is not produced. The success of this treatment depends absolutely, in many instances, upon the gentleness and care with which the injection is given, and the water must be allowed to trickle into the bowel rather than to enter it with any force, for three reasons: 1. If force is used, the bowel immediately resists the injection and, perhaps, forces it out. 2. It becomes so irritable that further injections are impossible. 3. This condition of rectal irritability reflexly causes irritability of the entire intestinal tract in much the same way that rectal ulcer may cause diarrhœa, and, as a consequence, the patient is worse than before the method was attempted. In those cases of chronic diarrhœa in which the patient is markedly emaciated and unable to digest much food, so that the condition of impaired nutrition is an important factor in preventing recovery, this method of treatment is to be highly recommended, and it is worthy of note that a small rectal injection, amounting to an ounce or two of iodoform and sweet-oil emulsion, in the proportion of 5 grains (0.32 gramme) to the ounce (31 grammes), injected into the bowel after a large watery movement has passed away, will relieve any tendency to tenesmus and, by the absorption of a small amount of iodine, exercise a useful influence over the underlying catarrhal process.

[This editorial is a timely one. The writer is undoubtedly correct in stating that sufficient attention is not given by practitioners to the employment of injections in the treatment of diarrhœa.—J. P. C. G.]

Streptococcous Enteritis.

There are, according to Eguet and de Cérenville, of Geneva,¹¹⁹¹ two distinct forms of streptococcous enteritis, the acute and the typhoid forms. Of the acute there are three varieties:

one sudden and intense, choleric form and limited to the digestive tube; the second, complicated by peritonitis; the third, a generalized form, engendering the syndroma of acute pyosepticæmia. The differential diagnosis between choleric enteritis and cholera is difficult and can only be made by means of a bacteriological examination, while, on the other hand, it is easy to differentiate between cholera from the pyosepticæmic variety, since the latter is accompanied with great fever and tumefaction of the spleen,—symptoms absent in cholera; in addition, no muscular cramps are observed, but symptoms of peritonitis often develop with great rapidity. The prognosis of streptococcal enteritis is grave; of eight cases observed, seven proved fatal. Of four cases of the typhoid form observed by de Cérenville, coming on after the ingestion of suspected food, and in one case after the use of the thermo-cautery in the treatment of hypertrophied tonsils, the prognosis was better, all the patients recovering. This form may be distinguished from typhoid fever by its sudden onset, shorter period of incubation, and the presence from the beginning of a fetid diarrhœa resisting all medication. The tongue may remain clear for a long time; bronchitis is uncommon or but light in form; the spleen is not so hypertrophied as in typhoid fever; the exanthema is not characteristic, or may be entirely absent; the central nervous system is not involved, and the fever affects an intermittent type. The point which differentiates it most clearly from typhoid fever is its tendency to acute localization in the peritoneum, lungs, or pericardium. In a case seen by the author there was a severe pain after the second day in the right flank, increasing rapidly until a peritonitis of cæcal origin seemed imminent; these symptoms then rapidly disappeared, but next day a pleuro-pneumonic area was noted at the base of the right lung, with all the appearances of pneumonia of embolic origin, and dry pericarditis. These new symptoms also disappeared in their turn. In another case there was also an attack of dry pericarditis, and on the fifth day an abundant intestinal hæmorrhage.

Holst ²⁰¹²₉₅ studied four epidemics of acute gastro-intestinal catarrh in Christiania, and found that all the persons affected had received milk from the same dairy, and had consumed it without boiling. The symptoms appeared soon after its ingestion, were not characterized by fever, and lasted half a day in most cases and several days in two or three. The milk contained numerous pus-cells with masses of diplococci and streptococci, which yielded the streptococcus longus on cultivation and caused fatal peritonitis when injected into animals, masses of the same streptococcus being also found. Investigation showed that a cow suffering from mas-

titis was kept in the same shed as the cattle which had furnished the milk used during each epidemic. The milk of this cow also contained the streptococcus longus and had not been previously used for food, but had been delivered by mistake on the day on which the cases occurred.

Membranous Colitis.

Touvenaint⁹⁹⁶_{July 26, '96} describes this affection as one characterized by a mucoid discharge presenting the appearance of a ribbon-like or tubular false membrane. It is observed most frequently in women, especially in those with genital affections. He quotes Letcheff as dividing it into two classes, the mechanical and infectious, the former being due especially to constipation and the latter to the spread of infection from the genital organs to the rectum. In the majority of cases the infectious cause is the predominating and often the only one. It may, as pointed out by Germain Sée, be connected with another cause altogether independent of that of the pelvic organs, but capable of giving rise to muco-membranous colitis,—viz., intestinal muscular atony. With regard to the infectious form, the pathogenic agent, which may be present in a latent state for a certain period, may at any moment encroach upon the lymphatic plexus of the true pelvis and the rectal coats. It may therefore be regarded as infectious, either by propagation directly from the genital organs to the intestine or indirectly by putrid absorption due to a mechanical trouble of genital origin. Muco-membranous colitis generally presents itself in patients who have suffered for many years from abdominal symptoms, and is but rarely met with early in the history of a uterine affection.

Pichevin, of Paris,²⁴_{Mar. 17, '96} asks, in connection with the theory advanced by many authors, that colitis is due to utero-vaginal infection, how this theory would explain the cases observed after retrodeviation, fibroid tumors, periuterine tumors, and puerperal metritis, as well as the cases observed in women suffering from no genital trouble. And whence originates the infection when colitis occurs in a man? Is there a vaginal or uterine microbe known to be capable of causing an hypersecretion of intestinal mucus and a formation of false membrane composed of globulin and mucin, without alteration of the mucous membrane of the colon? For it is to be noted that the colon is the primary seat of the pathological condition, and not the rectum, which, according to this theory, would receive the vaginal microbes. Pichevin also recalls the fact that so far no microbe proved to come from the vagina or uterus has been found in the large intestine; and, even having such proof,

it would yet remain to be demonstrated whether such a microbe was pathogenic and whether it produced muco-membranous colitis. Pichevin himself believes that in such cases the colon bacillus penetrates into the circulation and produces symptoms of more or less gravity, the intestinal inflammation being a secondary complication in the infection.

Interesting in this connection are some experiments made by Courmont and Doyon, of Lyons, ²¹¹_{May 26, '95} on dogs, in which they produced muco-membranous enteritis rapidly after intra-venous injection of diphtheria toxins.

[I do not think enough stress has been laid, by the writers quoted, upon the influence of the nervous system in the production of the disease. While mechanical and infectious causes may be active in some instances, in others the condition cannot be associated with any such factors.—J. P. C. G.]

John G. Coyle ⁸¹⁴_{Feb. 1, '95} states that the chief symptoms are the discharge, at irregular intervals and for varying lengths of time, of membranous exudations from the bowels, preceded by loss of appetite, gastric disturbances, mental depression, and great lassitude, and accompanied by severe pains located in the colon and by lack of febrile excitement. The color of the membrane is white or gray, sometimes resembling the white of an egg, thin white skin, or ribbon-like pieces of true whitish membrane. Touvenaint ⁹⁹⁶_{July 25, '95} regards the abdominal pains as the most prominent symptom. These pains, which often precede the evacuations by some hours, are frequently localized in the left side of the abdomen and follow the course of the descending colon and of the sigmoid flexure. The pains may become generalized or may be most decided near the transverse colon or, at other times, near the cæcum, generally ceasing after the evacuations, though the abdomen remains very sensitive. Besides these spontaneous pains there is pain upon abdominal palpation in different portions of the large intestine and particularly the region of the sigmoid flexure. In such cases the pain is at its height in the entire left iliac fossa.

H. Richardière, of Paris, ¹⁷_{Jan. 5, '95} observed a case of muco-membranous enteritis complicated with a spleno-pneumonia similar to the reflex pulmonary congestions met with in intestinal obstruction, strangulated hernia, or hepatic colic, but which, on account of the grave general symptoms, fever, and albuminuria accompanying it, should rather be compared to infectious broncho-pneumonia of intestinal origin.

The nervous complications of muco-membranous enteritis, as reviewed by A. Mathieu, ¹⁰⁰_{Oct. 27, '94} are most varied, among those noted being dyspnœa, pseudo-angina pectoris, generalized trembling

during digestion, inaptitude for work, headache, aphasia, temporary amnesia, infantile convulsions, coma, etc. Epilepsy and chorea, however, have not been observed, and for this reason the cases recorded by F. Cautru³¹_{Jan. 12, '96} are of special interest. Two of them presented hysterical—one epileptic and the other choreic—symptoms dependent on the condition of the intestine and disappearing as the state of the latter improved.

C. P. Crouch,¹³¹_{Mar., '96} in discussing several cases of membranous enteritis under his care, states that the disease is apparently one which does not yield to treatment in the majority of cases. It may improve while the patient is under treatment, but it also improves for a time without any treatment at all. It is not a fatal complaint. People may have it for years and pass vast quantities of mucus, and yet look fairly well at the end of that time. It often improves temporarily, and then returns after a short or long interval. In some cases it recurs at regular times and continues to do so every month or so for years. It almost always occurs in dyspeptic and somewhat neurotic patients. It is essentially a disease which is affected by the mental state of the patient. In some cases worry always brings on an attack, while freedom from care is almost essential to its cure.

The prognosis is not generally grave, in Touvenaint's⁹⁹⁶_{July 25, '96} opinion, especially when the attacks are not very intense or when they occur at short intervals. However, the disease constitutes a serious complication, for it contributes greatly to produce cachexia and it is very rebellious to treatment. O. D. Doane, of Oregon,⁸²⁰_{Sept., '96} does not look upon the prognosis as especially favorable, since there is little prospect of ultimate cure unless a radical change can be effected in the circumstances and surroundings of the patient.

In the treatment, rest in bed is essential, Touvenaint⁹⁹⁶_{July 25, '96} states, with abdominal friction to soothe the pains, using a soothing liniment or camphorated oil to which laudanum has been added. If the pain is very acute, opiates may be given in small doses, either as a potion or an enema. Germain Sée recommends cannabis Indica, 0.1 to 0.25 gramme ($1\frac{1}{2}$ to 4 grains) daily. Letcheff recommended the use of copious irrigations with hot solutions of nitrate of silver in the proportion of 1 in 2000 or even 1 in 1000. These irrigations act on the intestine in three different ways: (1) by the quantity of liquid used, which cleanses the mucous membrane; (2) by the high temperature, which increases the secretions of the glands and expels the microbes lodged there; and (3) as an antiseptic, which, even in feeble doses, possesses an energetic power in destroying microbes. F. W. Bartlett, of Buffalo,¹⁷⁰_{June, '96} uses a solution of $\frac{1}{2}$ to 1 grain (0.03 to 0.065 gramme) of bichloride of

mercury to a pint (0.5 litre) of warm water for irrigation. Joseph H. Bacon, of Louisville, ²²⁴_{June, '95} uses salicylic acid, silver nitrate, or iodoform for medication by enemata. In the great majority of cases, when the colitis of women with uterine disease is not accompanied with complications, these irrigations nearly always suffice; but when it has reached the chronic stage, particularly after the uterine affection is cured, general and local treatment, and especially symptomatic medication, must be resorted to. In the typhoid form calomel is useful. In the serious chronic forms milk, soup, eggs, raw meat, and rich bouillon are given; and, to strengthen the patient, cinchona, kola, and alcoholic frictions. The treatment of the affection is also discussed by Mérigot de Treigny ¹⁴_{Mar. 27, '95} and E. Main. ⁹⁹⁶_{Sept. 25, '95}

Dysentery.

From experiments made by them in sporadic and epidemic dysentery, A. Celli and R. Fiocca, of Rome, ⁵⁰_{Mar. 15, '95} conclude that protozoa must be of very secondary importance in the etiology of dysentery. On the other hand, the bacterium coli is constantly present, often in pure culture, at other times associated with the pseudotyphoid bacillus. They call attention to a variety of the bacterium coli which produces a toxin capable of producing experimentally the lesions of dysentery, when administered by the mouth, rectum, or subcutaneously.

An epidemic in the vicinity of Lake Maggiore gave de Silvestri ⁵⁸⁹_{No. 292, '94} the opportunity of examining the liquid stools of dysentery and of recognizing a special diplococcus, which, injected into animals, caused a characteristic diarrhœa.

Cassagrande and Barbaglio-Rapisardi ⁵⁰⁵_{No. 66, '95} communicated to the Catania Academy of Natural Sciences the results of a biological and clinical study of the amœba of the colon. Their observations included 235 cases of diarrhœa and dysentery, and in these they found the amœba 86 times, most frequently in cases of typical diarrhœa, less often in simple catarrhal enteritis, and least frequently in sporadic dysentery, whether mild or fatal. They therefore deny any pathogenic importance to the amœba, and even feel disposed to ascribe to it an opposite rôle; for in their experiments upon cats they found that the amœba swallowed up numerous microbes, and that where amœbæ were numerous but a small number of microbes were met with. They are therefore of the opinion that the amœba prevents the development of bacteria and permits healing of the lesions, thus explaining the vegetating form of the ulcerations observed by Councilman and Laffleur. The amœba prevents an acute evolution of the process, which in turn

explains why amœbic dysentery is of a chronic type, as assumed by so many authors.

Gasser⁴⁵⁷_{Mar., '95} is also inclined to call in question the importance of the amœba as the chief cause of dysentery. That it has some causal influence is most probable, but that it is only partly responsible seems confirmed by his investigations in 153 cases of dysentery, in which the bacillus coli and bacillus pyocyaneus seemed to play a more important rôle. The amœba coli was present in nearly half of the acute cases and in 13 out of 34 chronic cases, but there was no relation between the numbers present and the severity of the case. In order to further approximate the value of their presence, Gasser examined the stools of perfectly healthy individuals, with the result that amœbæ were present in considerable numbers in 20 per cent. Ulceration similar in every respect was produced in the large intestine of a cat by injecting into it dysenteric fæces, but on injecting sterile vegetable *débris* the same effect was produced. Vivaldi⁵²⁹_{No. 228, '95} also regards the amœba coli as of secondary importance.

The relation between tropical dysentery and abscess of the liver has been considered by a number of writers. The statistics of Zancarol, of Alexandria,⁷³_{June 15, '95} show that suppurative hepatitis is almost always the consequence of dysentery, or, what amounts to the same thing, that there is but a single pathogenic element concerned in the production of both diseases. As a proof of his statements, he says that if dysenteric fæces containing living amœbæ be injected into the rectum of cats typical dysentery will be produced, the animals dying usually in from thirty-nine hours to nine days, though some may survive and even recover; 7 out of 11 of those injected by him showed amœbæ in the evacuations. The classical alterations of dysentery were found at autopsy, the streptococci being present in the intestinal tunics in 11 out of 12 cases. Suppuration of the liver was seen 6 out of 12 times; and around or in the abscess streptococci, and not amœbæ, were found, while none of the latter organisms were seen in sections of the intestine or liver. In like manner, if pus from an hepatic abscess, sterile and without amœbæ, were injected into the rectum of cats, typical dysentery resulted, and in 4 out of 7 cases abscess of the liver. Streptococci, and not amœbæ, were found everywhere present.

A. W. D. Leahy, of Calcutta,⁶_{Apr. 13, '95} cites a case which warrants him in affirming that so-called single tropical abscess of the liver does, in some cases, owe its existence to a previous attack of dysentery, and is due to the amœbæ finding their way from the diseased part to the liver.

Meslay and Jolly,¹⁴_{Oct. 9, '95} showed to the Paris Anatomical Society

the intestine of a child that had shown symptoms of dysentery during convalescence from measles. Five centimetres above the anus there was a large, broad ulceration of the mucous membrane, with ragged and serrated edges, and on the rest of the rectum small ulcerations, greatest in their transverse diameter. In the ileum and the colon there were only some small, swollen follicles and some rounded follicular ulcerations, while there were no alterations in the small intestine. Cornil stated that the sections had every appearance, histologically, of subacute dysentery, and that the beginning development of small mucous cysts inside of closed follicles could be seen,—a sort of budding out from the glandular *culs-de-sac* by a mechanism formerly observed by him in several cases of sporadic dysentery.

Among other complications of dysentery, external otitis and phlegmon of the mastoid process were observed by Mathias and Gasser,²⁴³_{No. 6, '95} seventeen days after the appearance of the intestinal affection, in a soldier. The bacterium coli was found in the supuration.

J. Brault, of Algiers,²¹¹_{Jan. 27, '95} cites a case of severe dysentery complicated with infectious pseudorheumatism, arthritis with seropurulent effusion of the left knee, necessitating arthrotomy and drainage of the articular *culs-de-sac*.

Troitzky³¹_{June 8, '95} describes three cases complicated with nephritis, diagnosis in two being confirmed by autopsy. Such cases sometimes are so insidious in evolution that the nephritis is unperceived not only during the dysentery, but even long after the cure of the original disease. On the contrary, in other cases or under less favorable conditions the symptoms of nephritis are very plain. A case of amœbic dysentery with spontaneous cure is described by G. J. Preston and J. Ruhräh, of Baltimore.¹_{Nov. 10, '04}

Treatment.—A. de Butts²_{May 18, '95} and J. S. McCutchan²_{May 25, '95} have both had good results from the use of fresh seed-fruits, such as strawberries, grapes, and figs, in the chronic form. W. Hale White⁶_{July 6, '96} cured a case of more than four years' standing by rest in bed and a milk diet,—a treatment recommended by Ward⁹⁰¹_{Feb. 22, '73} and Leach¹⁵_{Dec., '70} some years ago. The milk diet should be continued until the pain, diarrhœa, and passage of blood or mucus have all ceased and formed motions have been passed for some time; the patient should not get up till at least a fortnight or three weeks after he has passed from milk to farinaceous diet. In the author's case the restricted diet was continued, although the patient lost weight. Provided that he is not allowed to become too weak, this is esteemed of little importance compared with the advantage gained from rest to the colon.

Bense ⁴⁵¹_{Oct., '96} calls attention to a remedy employed by his *confrères* in the Dutch East Indies,—viz., iodoform injections, consisting usually of iodoform, 3 grammes (46 grains); gum-syrup, 200 grammes (6½ ounces). This is sufficient for three injections, —morning, noon, and night. As soon as the number of stools has diminished the iodoform is discontinued, as it is no longer efficacious.

Zancarol, of Alexandria, ⁷³_{June 15, '96} places most reliance on ipecacuanha, preferably 0.50 gramme (7½ grains) with 0.05 gramme ($\frac{7}{8}$ grain) of opium, morning and evening, until no more blood appears in the stools and the tenesmus is relieved. Enemata with nitrate-of-silver solutions every few days are also recommended by him.

Benzo-naphthol has been employed by José A. Clark ⁶_{July 20, '96} in an epidemic of dysentery which occurred in Alquizar, Cuba, and during which he had 137 cases of the disease under treatment; of these he considered 23 as serious and 114 as of a mild type. The mortality among those treated with ipecacuanha and calomel, opium, etc., amounted to 9 per cent., while that among those treated by benzo-naphthol was scarcely more than 2 per cent. This drug had the great advantage over the more usual ones of not causing vomiting, salivation, or depression of the circulation, and it also brought patients through the attack more rapidly. Forty-five grains (3 grammes) per diem were given to adults and but little less to children.

Henry Galloway, Surgeon-Major of the French India Colonies, ²_{Feb. 2, '96} related eight cases as examples of the curative effects in chronic dysentery of large enemata of solution of nitrate of silver in distilled water, 20 grains (1.3 grammes) of the crystallized nitrate to a quart (litre) of distilled water. He used the same process as that indicated by le Dantec against acute dysentery. The patient was placed on his right side with the left thigh bent; an enema of tepid water was given first, and when this had acted the solution of nitrate of silver, to which 20 to 30 drops of laudanum had been added, was thrown up. The patient tried to retain it for a few minutes, two, three, or five minutes being the maximum; sometimes it was evacuated in two efforts, the second evacuation being separated from the first by a few hours' interval. The only immediate ordinary consequence of the washing was a sensation of stricture at the lower part of the rectum, which passed away after a quarter of an hour at most. Often from the first washing the amelioration was complete, but, at any rate, it could be relied upon to follow the third or fourth washing. To secure, however, permanent relief, it was necessary to continue

the treatment, and the author recommended a course of sixty washings.

Powdered cinnamon in drachm (4 grammes) doses, mixed with a few drops of water and made into a ball, to be taken morning and evening, and washed down by a mouthful of water, is a treatment derived from the Persian, and tried by S. T. Avetoom⁶ Mar. 2, '95 for the past two years, thirty cases being thus cured, some by one or two doses, the worst by six doses.

Chaparro amargosa, a Mexican shrub, is recommended by W. J. Crittenden, of Unionville, Va.,⁸¹ June, '95 and R. J. Knox, of Gonzales, Tex.¹⁴³ June, '95 According to the former the dose of the fluid extract is from 10 to 60 drops.

The treatment of acute dysentery is discussed by T. E. Schoolar, of Centreville, Ala.,⁷⁶⁰ June 15, '95 and W. C. Winslow⁸⁰¹ Sept. 29, '94; while Sir Joseph Fayrer, of London,¹⁵ Nov., Dec., '94 gives a fine review of the standard treatment.

Dilatation of Sigmoid Flexure.

Herringham and Bruce² Dec. 1, '94 describe a case of idiopathic dilatation of the sigmoid flexure. The patient, a man 78 years old, had been suffering for eight days with suppressed action of the bowels. At the end of that time the symptoms pointed to chronic obstruction. There had been a history of lifelong constipation and of a similar attack five years before, which had been overcome by a strong purgative. For the last six months his general health had been excellent, and the constipation had given place to regular action of the bowels. No stricture could be felt *per rectum*, nor any tumor in the abdomen. There had been considerable distension, which seemed to involve the transverse colon. A diagnosis had been made of faecal impaction or some non-malignant stricture above the rectum. Attempts had been made for two days to relieve the obstruction by purges and enemata, but on the third day the patient had become worse and an operation was performed, during which faeces were found in the peritoneal cavity. The patient died a few hours later. An enormous dilatation of the sigmoid flexure was found which covered almost the entire front of the abdomen. The inner surface was extensively ulcerated, and in several places it was black and gangrenous and in others had given way, permitting faecal extravasation into the peritoneal cavity. There were old adhesions to the liver and to the omentum, and there was recent peritonitis. There had been no stricture and no mechanical cause could be discovered for the dilatation, which the old adhesions showed to have been of long standing. The intestines above and below the sigmoid flexure were natural. Ac-

cording to Herringham such cases are extremely rare, only eleven similar cases having been recorded, three of which had been due to sigmoid dilatation. In one case faecal impaction had explained the condition, but in the others no sufficient cause had been found.

Constipation.

Jules Simon, of Paris, ^{35 673}_{Jan. 19, '96; Feb.} calls attention to the indolence of the cæcum occurring in children of sufficient age to be left considerably to themselves. They eat in a careless manner, and frequently eat too much. The food remains in the cæcum and large intestine, giving rise to such symptoms as headache, incapacity for study, paleness, and irregular and capricious appetite. Although there is a daily movement of the bowels, this is not sufficient, and the cæcum and colon, on palpation, will usually be found sensitive and engorged. In such cases Simon employs a symptomatic treatment against the constipation and hygienic and preventive measures against the return of the trouble. As external treatment, friction and massage of the abdomen, with the continuous current, if necessary, are employed, and if there is any congestion of the cæcum or pericæcal ganglia the parts are painted with tincture of iodine or small blisters applied. Simon believes the diet to be of great importance, and advises that no solid foods be taken, but that meats, fish, etc., be reduced to a fine pulp, and vegetables be given in the form of a *purée*.

Boas ⁴¹_{Jan. 15, '96} recommends the introduction of a large quantity of water into the intestine in order to diagnose a condition of atony or dilatation. From 500 to 600 cubic centimetres (1 to 1½ pints) are necessary in order to produce the splashing sound in the normal intestine, perceptible in the neighborhood of the transverse and descending colon; while only 300 or 400 cubic centimetres ($\frac{3}{5}$ or $\frac{4}{5}$ pint) will produce the sound if there is atony or dilatation; and in such a case it is perceptible first in the sigmoid flexure, then in the transverse colon, and finally in the entire large intestine. Change of position produces a succussion sound, and dilatation of the sigmoid flexure may be ascertained, which may be beyond the median line. In the same manner displacement of the transverse colon may be determined, and if simple atony only is present the splashing will be heard in the normal position of the colon, while if there is also displacement the sound will be heard under the umbilicus. It is indispensable to evacuate the intestine with a purgative before performing this lavage. In catarrh of the intestine the water will return charged with mucus and false membrane, while if the intestine is normal the water will be clear or will contain only some slight epithelial *débris*.

W. M. Beach, of Pittsburgh,¹⁶¹_{June, '96} says that many cases of constipation are treated unsatisfactorily with medicine when the real cause is in the rectum. The presence of thickening of skin and mucous membrane, irritable ulcer or fissure, fistula, or hæmorrhoids frequently interfere with the treatment instituted.

Fæcal impaction in the ano-rectal space was found by T. H. Manley, of New York,¹⁹⁹_{Oct., '96} to give rise, in one case, to symptoms of enlarged prostate. For fourteen years the patient, a man 71 years old, had not had a natural movement, although he was under the impression that constipation could not be the cause of his vesical trouble, since his valet gave him an enema of soap-suds every morning, and he had a fluid movement daily. Rectal examination, however, showed, four inches above the anus, a stone, calcified, with a rough surface, a convex contour, and about the size of a small fœtal head. The following day, under the local use of cocaine, the anus was widely dilated and the enterolith removed. The effect on his whole system was remarkable, but in no particular so marked and positive as in at once dissipating the vesical symptoms.

The following method of treating constipation has been followed by J. Schreiber, of Vienna,¹¹³_{B.36,p.808;}⁸¹⁴_{Aug.1,'96} with good results: The patient is made to lie upon a bench about thirty-two inches wide and covered with a hair mattress. A bed or sofa, being elastic, would not answer the purpose, as the strength of the attendant would be wasted. The patient is clad in light flannel underwear, the head supported by means of a pillow, and the knees bent up, in order to relax the abdominal muscles. Then the large intestines only, from the cæcum to the rectum, are massaged, as it is usually in that portion of the intestinal canal that fæcal masses are formed and retained. Considerable force is employed, the large intestines being pressed against the ilium by means of the fingers held stiff. The one hand is put over the hypochondriac region, while the other is rubbed toward its fellow. The portion of the large intestines covered by the lower costal arch may be reached by pressing deeply with the finger-tips under the ribs. The descending colon, the sigmoid flexure, and the rectum, being covered by the small intestines, can only be reached by exerting pressure through the latter. The rectum is best reached by pressing with the index and second fingers between the horizontal ramus of the pubis and the bladder. A strong action can be exercised upon the large intestines by putting the fingers perpendicularly over the groins in such a way that the right hand lies over the descending and the left hand over the ascending colon; pressure and motion are then exercised along the course of the

colon, thus stimulating the large intestines to action and forcing the fecal matter toward the rectum.

Some years ago Sahli, of Berne, advised many of his patients suffering from torpid bowels to roll a five-pound cannon-ball over their abdomens for five or ten minutes every morning before rising, and in this way quite a number of them were cured of constipation. Douglas Graham, of Boston, ⁹⁹_{Nov. 7, '95} proposes, as a much more effectual mechanical means, and one which patients can also use for themselves, to percuss and pound their abdomens for a few minutes, morning and evening, with the inner border of their fists, in the direction of the ascending, transverse, and descending colons. Alternating with percussion, friction and deep kneading may also be used. In the case of a patient who had suffered for years from obstinate constipation, and for whom laparotomy had been considered necessary, it was stated that he could walk twelve miles with ease, that his bowels had moved every other day regularly after he had percussed them for a week, and that, five weeks after commencing his pounding, he was eating freely of generous mixed diet, with no dyspepsia. He has since continued well. While in hospital he had had vigorous massage of the abdomen for fifteen minutes every morning. It was probably so vigorous that it missed its aim by causing the muscles of the abdomen to contract so strongly that the impression did not reach the intestines at all.

George L. Romine, of Lambertville, N. J., ⁸⁰_{Sept. 16, '95} has for the past ten years treated chronic constipation by means of forcible dilatation of the anus, when this is found on examination to be contracted, irritable, and resisting to the finger, and if there has been a habit of resistance to normally-formed passages. Henry Illoway, of New York, ⁵⁹_{Dec. 1, '94} does not approve of this method except when constipation is associated with fistula.

[I do not think the method is a proper or a safe one to be recommended in this general way.—J. P. C. G.]

Khalifa Rashd-ud-din, of Chakrata, ²³⁹_{Oct. 16, '94} relates the following case, illustrating the value of a "good shaking" in suitable cases: An old villager, aged 70 years, complained that after a meal of coarse food and some hard work his bowels had not been moved for five days. Examination showing abdominal distension with restlessness and other symptoms of volvulus, he was ordered large enemata with belladonna and opium; but as these did not seem to relieve him laparotomy was suggested, to which neither he nor his sons would consent. The sons lashed some bamboos to a *charpoy*, on which they laid the old man and carried him away to their village, some fifteen miles distant; but when they had almost reached home the father passed flatus, followed by two or three

free motions, after which he declared himself perfectly well. The rough jolting of this improvised palanquin had relieved the volvulus.

Luys, of Paris, ²⁴_{Sept. 23, '95} uses hypnotic suggestion in constipation. The patient having been sent off to sleep, the first thing to be done is to touch the abdomen. This contact produces an intense effect on the patient, as though some special action were then and there taking place in the intestinal region. The next thing is to order the patient to go to stool, or to have a desire to do so as soon as the *séance* is over, or else at whatever hour may be thought suitable; the operator repeating the order many times, first in the patient's right ear and then in the left, during the lethargic stage and also in that of somnambulism. Numerous experiments at the Charité have made it evident that, although sleeping, the subject is unconsciously aware of time and duration. As a matter of fact, as soon as the hour fixed on by the operator arrives, the patient immediately feels the necessity for going to stool. Frequently the first defecation is accomplished with difficulty after the initial *séance*, because the accumulated and hardened matter, having already sojourned several days in the intestinal tract, does not speedily yield to the peristaltic action even when combined with that of the diaphragm and with the efforts of the abdominal muscles. In these cases it is necessary to repeat the *séances*, but, once the first breaking-up has occurred, the rest is easy. The activity of the peristaltic action, assisted by abundant secretions from the mucous membrane, renders it impossible for accumulations to recur.

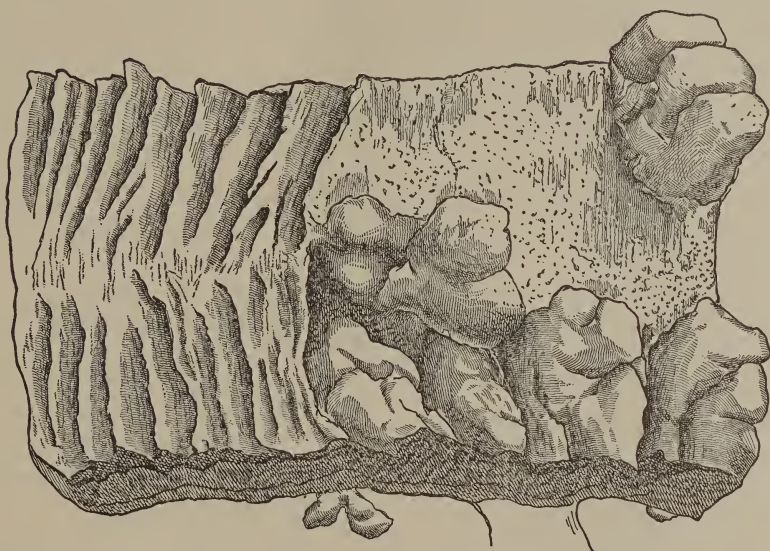
Intestinal Tuberculosis.

In describing the clinical features and pathological characters of a typical case of local cæcal tuberculosis occurring in a woman, aged 59, A. H. Pilliet and P. Thiéry, of Paris, ⁷³_{Nov. 24, '94}; ⁹⁰_{Jan., '95} point out that tuberculous dissemination in this form of intestinal tuberculosis may take place by different channels, which it is important to recognize, since they indicate the limitations of operative interference. Tuberculous extension, in cases of cæcal tuberculosis, may be: 1. By the peritoneum. Sometimes this is localized, and often the peritoneum enveloping the cæcal tumor is closely adherent to surrounding parts. 2. Along the intestine. The lesions are for the most part descending. The most extensive changes are in the region of the cæcum, but lessen in the colon, and in the small intestine are seldom met with. In a recently-published case neither large nor small intestine presented any tubercles. 3. Through the glands in the ileo-cæcal angle. Sometimes the glands of the mesentery and mesocolon may be extensively in-

volved, and affection of the vertebral glands, as far up as the diaphragm, may be met with. 4. By the iliac glands. This form of generalization is usually accessible to palpation, and constitutes an important contra-indication for operative interference.

The accompanying illustration shows the appearances in the case reported by the authors, the projections of the mucous membrane surrounding the flat ulceration having the aspect of villous cancer.

A case of primary tuberculosis of the intestines is recorded by E. Hodenpyl, of New York, ⁵⁹Mar. 9, '95 and a case of alimentary origin ending fatally in acute miliary tuberculosis by Zinn. ³⁴Sept. 10, '95



CHRONIC TUBERCULOSIS OF THE CÆCUM. (PILLIET AND THIÉRY.)

Progrès Médical.

Bounaix ²⁴³Nov., '04 observed a case in which death occurred suddenly from intestinal hæmorrhage due to tuberculosis. There were no pulmonary complications. For tubercular peritonitis see page D-63.

Intestinal Obstruction.

A case of multiple strictures of the small intestine, seen by Goldenbaum, ⁸⁵⁹No. 33, '95 is interesting on account of the number of the strictures—ten in all—involving only the jejunum, and on account of the obscurity of their origin. None of the usual causes—tuberculosis, syphilis, cancer, dysentery, etc.—could be invoked.

Mérinescu and Bobulesco ¹¹⁸Jan., '95 describe a case of internal strangulation by Meckel's diverticulum, followed by intestinal and

peritoneal perforation, in a girl of 4 years. Sven Lysander, of Stockholm, ³⁷⁰_{v.57, No.4} observed the case of a girl, aged 11 years, who showed symptoms of acute appendicitis, with meteorism. Death finally took place in collapse, and at the post-mortem examination the lower part of the ileum, as far as its opening into the cæcum, was found massed together into a ball, livid in color, showing several spots of gangrene, but no perforation. The cæcum and appendix, lying close by, were quite healthy, and there was no generalized peritonitis. About thirty-five centimetres from its opening into the cæcum a diverticulum sprang from the ileum, about seven centimetres long and about the same thickness as the ileum itself, somewhat narrower at its base, and dilated into a sac at its apex. At the side of this apex was a string about six centimetres long and about as thick as a small quill-pen, which adhered at its lower end to the mesentery, about twelve centimetres from the point of departure of the diverticulum, a triangle being thus formed in which the ileum situated below had become incarcerated. The bowel beyond the zone of incarceration was distended and its contents fluid. (Report of Dr. Eklund, corresponding editor, Stockholm.)

J. Multanowski ²⁰⁴³₉₆ states that in intestinal obstruction the walls of the intestine allow the colon bacillus to pass readily, while they may also permit the passage of other bacteria, even before necrosis has set in; all that is necessary is a cessation of circulation in the intestine for five or six hours, or distension of the walls by gas, with consequent irritation. The number of microbes observed by him in section of the intestinal walls, in cases of obstruction, increased in proportion to the anatomical lesions present.

M. Lemonnié, of Val-de-Grâce, ¹⁴_{Nov.11,'94} reported to the Société Médicale des Hôpitaux a case of intestinal obstruction without faecal vomiting. The patient died from broncho-pneumonia due to the colon bacillus. The autopsy showed that there was incomplete primary occlusion of the middle portion of the transverse colon and secondary occlusion of the pyloric end of the duodenum. The ascending colon and the first part of the prolapsed transverse colon seemed to have exercised pressure from above upon the pylorus through the pyloro-colic ligament. The duodenum, held to the right by its suspension-loop, was thus crushed, as it were, upon this loop and a true strangulation of the pyloric end of the duodenum resulted.

A case of death from impaction of the large bowel by undigested wheat is described by George B. Somers, of San Francisco. ¹⁴⁷_{Oct., '94} Braquehay, of Paris, ¹⁴_{July 21,'96} at the autopsy of a child 7 weeks old, found a diverticulum adherent to the right half

of the base of the mesentery, forming a stricture and causing occlusion.

Schüle, of Berlin, ⁴_{Nov. 5, '94} describes a case of duodenal obstruction due to a gall-stone, and followed by recovery, the stone being spontaneously evacuated. A similar instance is recorded by J. W. Smith, of Manchester. ⁹⁰_{Apr., '95} Wm. Fitch Cheney, of San Francisco, records ¹⁴⁷_{Apr., '95} a case of cicatricial stenosis of the intestine due to general miliary tuberculosis.

Intussusception.—The mechanism of one form of intussusception was demonstrated by R. T. Morris, of New York, ¹_{Feb. 23, '95} to the Philadelphia Medical Society. He exposed the ileum of a rabbit, and it was observed that when it was touched with sodium carbonate contraction of the circular fibres of the bowel at the point touched would take place in from fifteen to thirty seconds. The longitudinal fibres of the bowel, still carrying on peristaltic movement (a reversed peristalsis, by the way), would invaginate that portion of the bowel which was in a state of firm contraction. He did not know the exact value of this experiment, except that it showed the mechanism of one form of intussusception. It is known that certain ptomaines produce muscular spasm, and it is fair to assume that some cases of intussusception are due to a poisoning of the muscular fibres of the bowel, as in the experiment. In post-mortem intussusception, as he had watched it, there had been paralysis of the circular fibres of the bowel, and an adjacent segment of bowel had dropped into the relaxed portion, almost the reverse of the mechanism demonstrated in this experiment.

A case of intussusception in which the use of enemata led to rupture of an ulcer in the transverse colon is reported by H. L. Barnard, of London. ²_{May 11, '95}

Volvulus.—Johan Nicolaysen ³⁶⁹_{June, '95} has studied the etiology and pathology of ileus in thirty cases, with special reference to intestinal adhesions and motor disturbances of the intestinal walls. He finds that a purely mechanical twist of the intestine may give rise to symptoms of ileus without there being any paralysis of the twisted portion; also that pseudostrangulation may supervene after reposition of a gangrenous loop without peritoneal infection following. In six cases of volvulus examinations showed the importance of dilatation and paralysis as factors in the production of this form of occlusion. In two cases of rebellious coprostasis calculi were found to have caused complete obstruction for a considerable period. The faecal matter above the point of strangulation was found to contain but one or two species of microbes, and was sometimes poisonous owing to the toxins and gas (SH₂)

contained in it. Cases of ileus complicated by gangrene were characterized by great prostration and a pulse of over 100, while in cases without gangrene the pulse was not above the normal. When gangrene was not present the peritoneum was sterile or contained only a few microbes, while where gangrene was present the staphylococcus aureus or the colon bacillus was present in the peritoneum. The author, in experiments on guinea-pigs and rabbits, was able to vaccinate these animals against the bacterium coli, and to produce artificial strangulation, which they supported for from ten to twenty-seven hours. (Report of Dr. Levison, corresponding editor, Copenhagen.)

Treatment.—J. Grundzach¹¹³_{No.10,'96} records a case in which all the symptoms of acute intestinal obstruction disappeared upon the removal of a fish-bone from the anus, eight centimetres above the external orifice. The bone had been swallowed some twenty-four hours previously.

Prioleau, of Brives,¹⁴_{Aug.25,'96} states that in volvulus, especially of the sigmoid flexure, reposition is the less difficult in proportion as the amount of tympanites is less; but it may be rendered difficult by bends in the colon adding a mechanical obstruction to the volvulus. When there is great tympanites, reposition is impossible unless the gas above the point of obstruction be removed.

In the treatment of intestinal obstruction in general Thornley Stoker²_{No.1778,'95} has never seen the application of heat and rubifacients do substantial service. Of belladonna, if used freely and early in the disease, he holds a favorable opinion, its best therapeutic effect being obtained without the addition of opium. Its chief use is in cases of peristaltic paralysis due to tympanites or fæcal accumulation, but it must be given in full and repeated doses, and pressed until it shows its constitutional effects of either dilated pupil or dryness of the throat. It may be combined with calomel. Sodium sulphate is useful in hourly doses of 1 or 2 drachms, until an ounce or more has been taken. For washing out the bowel an ordinary red-rubber tube, such as is used for lavage, presents the advantages that it can do no injury, that the fluid pressure can be regulated, that enormous quantities of water can be used, that the currents created by alternating pressure exert a solvent effect upon fæces, and that the operation can be carried on for quite a long time without exhausting the patient. Althaus²_{No.1778,'95} stated that the knife affords the only chance for the patient's recovery in the case of absolute mechanical occlusion, such as strangulation by bands, etc. He cites two cases in which the faradic current, applied through an insulated metallic sound in the rectum, and a moistened conductor to the abdominal parietes

in the region of the sigmoid flexure, resulted in cure. Blondel and Larat have used the constant current as an electrical injection, the rectum filled with salt water connected with the positive pole acting as an electrode, the negative pole being a large electrode upon the abdomen. The strength of the current is regulated by the susceptibility of the patient. In pseudostrangulation and faecal obstruction relief has appeared in from five to twenty minutes. If a real obstacle is to be overcome, the current should be reversed after five or six minutes.

Arthur Sargent²_{Nov.24,'94} believes that, in the absence of strong contra-indications, inversion and taxis, with large enemata, should be given a fair trial.

Foreign Bodies in the Intestines.

Instances of comparatively large, pointed metallic bodies passing harmlessly through the alimentary tract are sufficiently unusual to justify allusion to a case seen by James Tily, of Chiswick,⁶_{Apr.27,'95}—a child, 5 years of age, who swallowed a scarf-pin an inch and a half long, with a head three-eighths inch in diameter, and voided it in forty-eight hours. Reverdin, of Geneva,¹⁹⁷_{Apr.20,'95} adds the case of a child, 7 years old, who swallowed a whistle a little greater in diameter than the smallest size of Murphy's button, evacuating it in twenty-eight hours; and Fourmeaux, of Lille,²²⁰_{Oct.12,'95} a case in which a girl of 14 years swallowed a pin five centimetres long, evacuating it in a week without accident.

Enteroliths.

An enterolith two inches long and one inch wide was removed by Wylie, of New York,¹_{May 4,'95} from a woman supposed to be suffering from hepatic colic. The stone was found in the small intestine. W. C. Phelps, of Buffalo,⁵⁹_{Sept.15,'94} observed a case in which an enterolith weighing $\frac{1}{2}$ ounce (16 grammes) was voided after taking $1\frac{1}{2}$ ounces (50 grammes) of castor-oil. The patient had suffered from occasional severe colicky pains for three years. In a case seen by Marais, of Honfleur,¹⁴_{Jan.16,'95} a sebaceous concretion was expelled spontaneously through a periumbilical phlegmon caused by the stone. Mörner³⁷²_{V.30,No.4} records a case in which fifteen intestinal calculi were removed by rectal irrigation.

Tumors of the Intestines.

A. H. Cordier, of Kansas City,¹_{Oct.26,'95} outlines the methods to be followed in examining intra-abdominal tumors. He states that tumors through which gases may be detected by gurgling indicate either an involvement of the bowel in the tumor or pressure of the

growth on the bowel, with adhesions to the same. If this symptom is coupled with a history of a pyloric cancer or a cæcal growth, it is confirmatory in its indications. Some growths have a disposition to change position, but all growths have one or more attachments, and it is safe to infer that this attachment is to the site at which the neoplasm had its beginning, its movements being only around an arc of a circle. Adhesions may prevent a growth from moving, or anchor a tumor in a locality far from its original point of starting, and here the history of the inflammatory attacks and pain aid in the diagnosis. The character of the pain and the amount and area of tenderness are of great assistance. The withdrawal of free fluid from the peritoneum often shows the presence of a tumor before undetected. Pus in the pelvis is one of the easiest conditions to diagnosticate.

Pässler⁴_{Aug. 26} describes a case of cancer of the cæcum which had been diagnosed as cancer of the hepatic flexure of the colon.

Ludwig Pick³¹_{Mar. 27, '95} relates the case of a woman, aged 46, from whom two primary cancers the size of a man's fist had been removed from the large intestine by Landau. Their cancerous nature having been ascertained by Virchow, the patient was kept under observation, and at her death, a year after operation, the diagnosis of primary cancer of the large intestine was verified, metastases being found in the peritoneum, retroperitoneal glands, left pleura, and abdominal tissues. The primary tumor had sprung from the endothelium of the lymphatic vessel and connective-tissue cells, thus belonging to the class of endothelial cancer of the serous membranes, very rare in the peritoneum.

Hauser³²⁶_{B. 55, p. 429, '95} describes the case of a man, aged 23 years, in whom extirpation of the rectum was practiced for polypi, which had caused bloody stools, but not marked stenosis. Operation was followed by death from peritonitis and pneumonia. At the necropsy epithelial proliferations were seen in glands having no relation with the cancerous proliferation, the entire tube being covered with a layer of perfectly normal cylindrical cells, while in other places normal epithelium was attached, without any transition, to degenerated epithelium. He supposes that the multiple glandular proliferations met with throughout the entire intestine bore some relation to the local cancerous condition which had supervened later on, though he does not regard them as necessarily the syndroma of cancer. These proliferations possess, however, a great predisposition to cancerous degeneration, especially in the lower part of the intestine, owing to the nature of their epithelium and being exposed to a state of chronic irritation.

A case of malignant disease involving the abdominal and

pelvic lymphatic glands and intestine, with secondary lesions, is described by H. B. Anderson, of Toronto, ³⁹Jan., '95 in a man of 65 years; a case of sarcoma of the great omentum, peritoneum, and abdominal lymphatics in a 4-year-old child, by Dörnberger ³⁴Nos. 35, 36, '96; and another in a child aged 12 years, by J. Vinokoureff. ¹¹⁵⁸Nos. 23, 24, '95 Störk, of Vienna, ¹⁴May 22, '95 found a lymphosarcoma of the small intestine at the post-mortem examination of a man of 24 years, who had presented a bosselated abdominal tumor during life, and who died in collapse after severe abdominal pains and vomiting.

In reporting two cases of retroperitoneal sarcoma, C. B. Lockwood, of London, ⁶May 25, '95 states his belief that the clue to the diagnosis of these growths is to be had in a correct appreciation of their anatomy. In the first of his cases the growth had spread behind the peritoneum and lifted up the intestines; so that the left colon ran down its front surface behind the left linea semilunaris. At the operation this part of the bowel was empty, but there must have been times when it was full of gas and capable of discovery by percussion. This information might not be obtained at one examination; but in a dubious case, such as this, the author thinks that no one would hesitate to defer an operation until several examinations had been made. In a second case this peculiar feature in the resonance of the tumor was actually observed, although its significance was not understood. The clinical notes showed that, after admission, the tumor was dull on percussion, and, a fortnight later, that there was a decided resonance in front of the lump, where none had been before. At the operation the appearance of this area of resonance in the front of the tumor was fully explained. The retroperitoneal growth had extended into the mesentery; so that the small intestines were distributed over the surface of the tumor. Without question, the variation in the areas of resonance was caused by one of these becoming distended. Lockwood states that retroperitoneal sarcomata are rare, but that others will be met with; and it will be interesting to learn whether those who find them will be able to confirm his supposition that they will possess irregular areas of dullness and resonance, and, moreover, that their areas of resonance will vary from time to time. According to C. P. McNabb, of Knoxville, ¹Mar. 23, '95 a very large percentage of retroperitoneal tumors, in children under 5 years of age, is cancer or sarcoma of the kidney, generally the latter.

Lead Poisoning.

An unusual source of lead poisoning is reported by F. J. H. Coutts, of Burnley, ⁹⁰Feb. 15, '95 in a man of 27 years, a worker in a rubber

factory. It appeared that this man had been for some time in the habit of chewing portions of soft, unfinished rubber, brownish red in color; and, as he believed that white lead and red lead were used in its preparation, the author examined it, finding by quantitative analysis that it contained 23.57 per cent. of lead. This comparatively enormous quantity accounted for the symptoms of lead poisoning.

In the case of a patient seen by Caton ⁶_{Dec. 22, '94} it was discovered that the tea, coffee, and soup consumed by the man and his family were made with water taken from the kitchen-boiler. This contained the usual lead worm. The water held in solution, on the average, 2 grains (0.13 gramme) of lead per gallon (4 litres). The patient's wife and child showed signs of lead poisoning.

O. Israel, of Berlin, ²²_{July 17, '95} observed a case of acute lead poisoning in a phthisical patient, aged 27 years, who had been given lead acetate for eighteen days in doses of 0.05 gramme ($\frac{7}{8}$ grain). The medicine was stopped after 4 grammes (1 drachm) had been taken. In the intestinal canal the acute lead poisoning showed distinctly, the whole intestinal tract from beginning to end being intensely red, with moderate swelling and slight dilatation.

Cras, of Brest, ²⁰⁰⁰_{'63} as early as 1863 noted the existence in lead colic of buccal patches, slaty in appearance, of the same nature as the gingival line described by Burton in 1840. Guyot, from recent researches, ¹⁹⁵_{Nov., '94} confirms the theories of Cras, but believes that the lead is localized in the red and white cells instead of in the plasma.

J. Brunelle, of Lille, ³⁶⁰_{Dec., '94} finds that alimentary glycosuria exists in at least 55 per cent. of cases of saturnine colic. The quantity of sugar eliminated is not great, and the amount of glycosuria is not in proportion to the intensity of the colic, appearing either in the light or severe forms. It is especially observed among workmen who have for a long time been engaged in preparing lead, and in those of alcoholic habits. The action of alcohol is here superadded to that of the lead, which in itself may sometimes cause hepatic insufficiency. The glycosuria persists for the same period as the colic, and in alcoholic patients sometimes lasts during convalescence. It is often accompanied by urobilinuria. The presence of glycosuria in cases of lead colic indicates that the liver is affected not only in its primary functions, but also in a transitory way.

Janowski ⁷⁵_{No. 7, '95} describes the case of a plumber, aged 27 years, who, in addition to the ordinary symptoms of lead poisoning,—colic, constipation, yellowish skin, tendency of the gums to bleed, blue line on the gums, fetid odor from the mouth, and a previous

ulnar paralysis,—exhibited embryocardia, the pulse at times attaining a frequency of 200 beats per minute, to be normal the following day. This was believed to be due to a direct action of the lead on the cardiac ganglia. Paralysis of the two lower branches of the right facial nerve and right-sided myosis with diminished light-reflex were also noted and ascribed to the lead poisoning, there being no other apparent cause. Lead was demonstrated in the gums and in the urine.

J. Peyrou, of Paris, ⁷⁸⁰_{Dec., '94} having obtained excellent results from the use of monosulphide of sodium in the treatment of lead poisoning in animals, applied the method to twenty cases at the Hôtel-Dieu, the St. Louis Hospital, and the Paris Polyclinic, using from 0.30 to 0.40 gramme ($4\frac{1}{2}$ to 6 grains) dissolved in glycerin, in two doses daily. This treatment is kept up for fifteen days if necessary.

DISEASES OF THE PERITONEUM.

Peritonitis.

Courtois-Suffit ²⁰⁰⁵_{V. 3, p. 606} ⁹⁹_{Feb. 21, '95} classes first in order, among the pathogenic microbes in peritoneal inflammations, the bacillus coli communis. This micro-organism is a facultative anaërobic, a normal inhabitant of the intestines, but pathogenic under morbid conditions, such as occur in all kinds of peritonitis of intestinal origin. Its presence has long been recognized in peritoneal exudations, while it is constantly found in septic peritonitis following intestinal wounds, perforating (gastric, typhoid, enteric, appendicular) ulcers, ischiorectal abscess, cancer of the colon, hernia, thrombosis of the mesenteric vessels, etc. It has been affirmed, says Richard Douglas, of Nashville, ¹¹⁹²_{Jan., '95} that under certain circumstances, as when disordered circulation, strangulation, extreme fæcal distension, undue pressure or mechanical injury has impaired the integrity of the bowel and lowered tissue-resistance, this bacterium may become migratory, gain the peritoneum, and excite inflammation. Cornil found such bacteria actually in the substance of the wall of a partly-necrosed intestine. The possibility of such migration may explain many cases of so-called idiopathic peritonitis attending stercoral impaction, severe bowel inflammations, etc.; the germs pass through the intestinal walls and provoke peritonitis. It is doubtful if peritonitis has ever followed cystitis, yet Achard and Renaut have proved the identity of the colon bacillus with the bacterium pyogenes of the bladder. The pneumococcus has very rarely any causal relation to acute peritonitis, whether the infection occur as a sequel to pneumonia or independently of that

disease. Ten cases are recorded, and Arnozan and Cassaët¹⁴ add another in a girl aged 18, and Kermisson¹⁴ one in a child of 10 years. Of these 12 cases only 2 were adults. Brault, of Algiers,⁵⁵ describes a case of what he regards as circumscribed peritonitis, due to pneumococci, in a patient 35 years old; but it is possible that in this instance it may have been due to appendicitis.

In a study of the rôle of micro-organisms in the etiology of peritonitis, I. M. N. Savinoff, of Moscow,²⁰⁴⁶ found that cultures of the colon bacillus, the Friedländer pneumococcus, and the staphylococcus aureus had the common property of producing peritonitis according to the virulence of the culture. The colon bacillus by itself caused peritonitis if the culture used was not attenuated; and the conditions claimed as indispensable factors in the production of the disease by this bacillus were active only in increasing the virulence of the micro-organism. The same was true of the pneumococcus and staphylococcus aureus. The quantity of the culture used in these experiments was a matter of no importance; if the culture were sufficiently virulent, a small quantity induced peritonitis. The quantity had also no influence on the gravity of the disease, except to a certain extent in the case of the staphylococcus; while the nature of the peritonitis, serous or purulent, had no relation to the quantity.

Ch. de Klecki²⁶² concludes, from a series of experiments on the virulence of the colon bacillus, that peritonitis of intestinal origin is generally a multiple infection, due to the invasion of the peritoneal cavity by various intestinal microbes, the majority of which are not virulent. The virulence of the colon bacillus is acquired under pathological conditions, and is partly due to symbiosis with microbes of other species; the more intimate as the growth of bacteria increases in the contents of the pathological intestine. This increased virulence is thus acquired not after the colon bacillus has reached the peritoneum, but in the intestine itself; and it is here that the principal pathogenic agent must be sought for. The contents of a constricted loop of intestine are exceedingly pathogenic, and it is their absorption which gives rise to the general symptoms observed in grave cases.

Ernest Knowling, of Tenby,² calls attention to the relation of latent ulcer of the stomach to general peritonitis, to which no reference is made in the principal text-books of medicine. He cites a case of his own lending support to the view that such an origin of peritonitis may not be uncommon.

Gourevitch⁵⁸⁶ relates a case of general hypertrophy of the intestine following chronic peritonitis, and two similar cases are

described by B. Goldenberg, of Odessa. ⁶⁹_{No. 2, '96} Potain ¹⁴_{Nov. 13, '96} discusses the diagnosis of suprahepatic peritonitis, generally due to perforation of the stomach or intestine. Investigation will nearly always reveal some previous disturbance of the digestive or biliary passages, more or less serious in character. When such a peritonitis has declared itself, the most important sign is the suppression of spontaneous movements of the diaphragm resulting from contraction. Its muscular rôle is abolished, and it becomes a simple septum. When the effusion has reached a certain size, the liver falls somewhat, and puncture in the suprahepatic region gives exit to pus. The influence of respiratory movements on the flow of the fluid may be observed; during expiration it issues freely through the trocar, while during inspiration it ceases to flow. This is exactly the reverse of what occurs when aspiration is performed for purulent pleurisy. When the effusion consists not only of liquid but also of gaseous elements, tympanites is present, and this may be distinguished from the succeeding resonance pulmonary sound by percussion from above downward. It is an abdominal pneumatosis, due to intra-peritoneal gaseous effusion in the suprahepatic region, and differentiated from pneumothorax in many ways, particularly by the existence of pulmonary resonance above the tympanitic region, easily recognized.

Rheumatism as a primary cause of peritonitis is probably frequently overlooked. In reporting four cases of primary acute rheumatic peritonitis, O. Grothan, of St. Paul, Neb., ¹⁰⁶_{Apr., '96} gives the following points in the diagnosis: 1. Early in the disease the saliva is acid; there is free acid perspiration and hyperacidity of urine. 2. There is pain and tenderness on pressure over the abdomen, but not the "board-like" condition of the abdominal wall due to pyogenic micrococci. 3. The tympanites is not so well marked as in peritonitis due to direct infection; nor is gaseous distension present, as in other varieties. 4. It can readily be differentiated from septic peritonitis by the history and general condition of the patient. 5. Tubercular peritonitis is, as a rule, more subacute and accompanied by ascites and other tubercular processes. 6. Constipation is less marked than in most other acute forms of peritonitis. 7. The circulation does not show the rapid, feeble pulse of septic peritonitis nor the wiry, thread-like condition seen in traumatism. 8. The temperature differs in no way from acute articular affection. 9. In none of the cases were chills present. W. H. Pearse ²⁶_{July 1, '96} also records a case.

In the course of one hundred and thirty consecutive autopsies in the Cook County Hospital, Byron Robinson, of Chicago, ³⁶¹_{Oct. 1, '96} saw three cases of a peculiar form of peritonitis. On opening the

abdomen the omentum was generally found rolled up in the region of the transverse colon, surrounded by a mass of connective-tissue cells and membranes. The small intestines were adherent in a solid mass. The connective tissue blended with the visceral organs as if it had gradually and slowly proliferated. The essential feature of this form of peritonitis or connective-tissue growth was a peculiar, white, transparent proliferation of connective tissue, almost identical with the subserous areolar tissue found about the kidneys and under the pelvic peritoneum. It was like a bed of newly-fallen snow, the flakes representing the white connective-tissue cells, while the crystals and spicula represent the cell processes. The connective-tissue cells and their processes were spongy and soft. Almost any viscus in the abdomen could be slowly enucleated from this connective-tissue bed of senile peritonitis. The connected or proliferated tissue could be torn from the old peritoneum, which is slightly altered, yet in its natural place. No clefts were to be seen between the loops of intestines, these forming a mass bound together by innumerable white cells and threads. The author states that he has only seen this condition in patients over 70 years of age. The proliferated tissue closely resembles the planes of mesoblastic tissue found posterior to the peritoneum.

Lancereaux was the first to call attention to the peritoneal localization of syphilis; this localization is, however, rare and occurs especially in the tertiary period; so that a case observed by Krupezky, of Dorpat, ⁶⁵⁰_{Oct. 3, '16} in the secondary stage is of especial interest. A robust, healthy man of 61 years became infected with syphilis, and six weeks later presented himself with all the secondary signs of the disease,—papular eruption, mucous patches, etc. Specific treatment led to their disappearance; but constipation supervened, at first temporary, but becoming more marked and rebellious against all efforts to relieve it. At the same time the abdomen increased in size, the appetite failed, and signs of intestinal obstruction appeared, but there was no pain and no physical or functional indication of peritonitis. The patient died from slow stercoral infection, and at the necropsy the peritoneal cavity was found to be filled with false membranes which had caused agglutination of the intestinal loops, the colon being adherent to the intestinal wall and the sigmoid flexure being so bound down by adhesions as to cause stenosis. The other organs appeared but little changed. It thus appears from this case that syphilitic peritonitis may appear in the secondary stage after the eruption; that it is painless and may pass unobserved; by its lower timbre; in pneumothorax this is absent, from the fact that

the lung is compressed. By changing the position of the patient the displacement of fluid can easily be ascertained, as in pyopneumothorax. Suprahepatic peritonitis sometimes remains latent and gives rise to secondary accidents. The treatment is purely surgical.

L. Revilliod, of Geneva, ¹⁹⁷_{Oct. 20, Dec. 20, '94} lays down the following rules of treatment for general peritonitis: The patient is kept without food for several days. Two or three leeches are applied to the most sensitive portion of the abdomen, this being supplemented by thin poultices, Neapolitan ointment, or warm, soothing applications, and calomel in small doses after the leeches have been removed. Internally a glass of iced water, containing 10 to 20 drops of laudanum, in teaspoonful doses, is given from time to time, to alleviate the pain. If this cannot be retained, a small enema of tepid water containing 10 drops of laudanum may be substituted. In six severe cases thus treated by the author the results were most satisfactory.

Tubercular Peritonitis.—A case of polyuria due to tubercular peritonitis is recorded by W. S. Gordon, of Richmond. ¹¹⁷_{May, '95} The patient was a negro child, aged 6 years, suffering from tubercular peritonitis, who drank from half a gallon to a gallon (2 to 4 litres) of water daily, and who passed the same quantity of urine. The analysis of the urine showed the specific gravity to be 1.000, reaction acid, and the absence of albumin, sugar, and phosphates. In this case the abdominal symptoms were not marked until rather late in the course of the disease, and it is interesting to note the occurrence of the polyuria in spite of the absence of these symptoms. It is believed by the author that abdominal disease leads to polyuria by pressure upon the abdominal blood-vessels or by stimulation of the abdominal vaso-constrictor nerves, thus increasing renal blood-pressure.

Folet, of Lille, ¹⁴_{Nov. 26, '94} cured a case of tubercular peritonitis by means of insufflations of air into the peritoneum, as advocated by Nolen. Kooperberg, of Berlin, ²²_{Sept. 11, '95} also reports two cases. The first was that of a girl of 13 years; 2200 cubic centimetres (41½ pints) of fluid were removed from the abdomen by puncture and air was injected. The temperature remained about 38° C. (100.4° F.) for two weeks, when she recovered sufficiently to leave the hospital. Six months later there was no return of the exudation. The second case was that of a girl of 15 years, whose girth was 77 centimetres. On tapping, 5 litres (quarts) of fluid were drawn off. Air was injected. The patient was free from fever on admission and remained so until she left the hospital ruddy and strong. Six months later there was no return of the exudation.

[This method may prove of advantage in cases where laparotomy is not permitted.—J. P. C. G.]

Catrin, of Val-de-Grâce, ¹⁴_{May 6, '95} tried injections of camphorated naphthol, as recommended by Rendu, ¹⁴_{p. 695, '94} in a case of tubercular peritonitis, with good results. Rendu, in the discussion, stated that he had performed an autopsy on a patient whom he had treated by this method and who had afterward died from caries of the sternum and generalized visceral steatosis. He found all the appearances of an old peritonitis, but no tubercles, though the liquid withdrawn before treatment had caused tuberculosis in guinea-pigs.

Netter ¹⁴_{May 12, '95} tried the remedy in the case of a child of 7 years that one of his colleagues had sent to him as a case of tuberculous peritonitis. He himself had inclined toward the existence of cirrhosis with peritonitis. Nevertheless he tapped the abdomen, drew off 2 litres (quarts) of liquid, and injected 4 grammes (1 drachm) of camphorated naphthol. Half an hour afterward the little patient became violently agitated, convulsions followed, and he succumbed in a few hours. The autopsy proved that it was not a case of tuberculous peritonitis, but of cirrhosis, with acute peritonitis provoked by the injection; consequently he would never again employ injections of this preparation for tuberculous peritonitis.

Rendu replied that the case was not to be compared to some of his in which the treatment succeeded, for it was a case of cirrhosis, and not of tuberculous peritonitis. The dose injected was a little too strong for a child, and, besides, it is customary to leave a certain amount of liquid so as to counteract the irritating effects of the naphthol.

Diseases of the Mesentery.

Chyle-Cysts.—According to W. H. Wenning ⁵⁹_{Oct. 5, '95} the origin of these cysts is very uncertain. In some instances undoubtedly rupture of a lymphatic, in consequence of an accident or unusual exertion, may lead to the formation of a cyst. Here, in all probability, the fluid effused between the layers of the mesentery causes some irritation and the formation continues to separate the layers from each other. In other instances a rupture may lead to effusion of chyle into the free abdominal cavity. Single cysts might very easily arise in the first-mentioned manner. When there are multiple cysts, however, the origin is more probably due to stenosis of the thoracic duct. From the nature of the conditions found in a case of his own he is inclined to believe that stenosis and obliteration of the thoracic duct was the cause of the numerous cysts.

Jones and Cleveland, who made an autopsy immediately after death, were unable to find the thoracic duct. There were no cysts, in the true sense of the word, if the sac be looked upon as an adventitious structure, for the chyle seemed to be surrounded by the walls of the mesentery alone. When this membrane was pierced or simply touched it would collapse. There was, however, evidence of considerable inflammation of the serous membrane.

L. Floersheim, of Paris, ¹⁰⁰_{Jan. 1, '95} met with a case in which a chyle-cyst of the mesentery simulated intestinal obstruction and ended in death.

An instance of thickened and contracted mesentery simulating tumor, in a case of cirrhosis of the liver, is recorded by F. Lucas Benham, of London, ⁵⁹_{July 6, '95} and one of diffuse suppuration of the mesentery with multiple abscesses of the liver, due to trauma, by Robert Funkhouser, of St. Louis, ¹⁰⁹_{Feb., '95}

Benda, of Berlin, ³_{Jan. 30, '95} observed the case of a woman, 73 years of age, who fell suddenly ill after a fright and complained of vomiting and severe pain in the epigastrium. Several days later icterus supervened and œdematous tumefaction in the epigastric region. The gastric juice being normal, there was no reason for suspecting a malignant tumor. After some slight improvement the patient was attacked with a pulmonary embolism and rapidly succumbed. At the necropsy numerous gangrenous patches were revealed in the adipose tissue of the abdomen, and in cutting into the gastrocolic ligament a large cavity was seen behind the colon, filled with brownish cylindrical masses, which were made up of gangrenous adipose tissue mixed with coagulated blood and numerous hæmatoidin crystals. The pancreas, though atrophied and pushed backward, had taken no part in the morbid process,—a point of interest in connection with previously reported cases.

Tachard, of Toulouse, ¹⁴_{Aug. 25, '95} cites a case in which puncture and evacuation of a serous cyst of the mesentery was followed by recovery, in spite of the fact that this method of treatment is regarded as dangerous, classical authors recommending extirpation and laparotomy, or, when this is impossible, marsupialization of the pocket. Tachard's patient was a soldier, presenting an intra-abdominal tumor as large as the head of a child at term, which at times caused severe pain. Capillary aspiration gave issue to 350 grammes (11 ounces) of a russet-colored fluid, and the tumor did not recur.

Ascites.

Chylous and adipose ascites form the subject of a praiseworthy clinical, historical, and experimental study by A. R. Ed-

wards, of Chicago, ¹¹⁷⁰_{Aug., '96} who proves that a transudate can undergo metamorphosis from serous to cellular, and come to contain fat. This places the pure hypotheses of the French observers upon a somewhat firmer basis, and a chronic peritonitis may therefore result in a chylous or adipose ascites. In 8 out of 97 cases studied by him the fluid, at first serous, became opaque later, but he believes that it is too much to say that pus-infection was the cause in all instances. Three cases were due to circulatory obstruction, 3 to hepatic disease, chiefly cirrhosis, and 2 to peritonitis.

W. Howship Dickinson, of London ⁶_{July 27, '96}; James Oliver, of London, ⁶_{Nov. 24, '04} and S. Talma ¹¹⁴_{B. 26, H. 1, 2, '96} also discuss this subject.

L. Bard, of Lyons, ²¹¹_{July 23, '96} gives the name of lumbo-abdominal wave to the ascitic wave obtained from behind, the patient being in a sitting posture. The front hand may be placed on various parts of the abdomen, while the posterior hand percusses the region of the quadratus lumborum on each side of the vertebral column. A transmission of undulations by the superficial soft parts may be avoided by not placing the anterior hand too near the lateral surface of the trunk, the superficial concussion never spreading as far as the median line, especially at the hypogastrium. The wave is not formed decidedly except from behind forward; it is very attenuated, or even is not found at all, except in cases of very abundant effusion, if formed from before backward.

Beaudouin, of Alençon, ²⁰³_{Oct. 15, '94} observed a case of ascites in a patient suffering from heart disease with a marked apex-murmur, in which sphygmographic tracings showed the systole to be slow and somewhat irregular, this condition not depending on the digitalis administered, since it was noted when the drug was discontinued. On auscultation, however, the sounds were very frequent and irregular, the beats being bigeminal or trigeminal, and even sometimes quadrigeminal. Thus a complete revolution of the heart, appearing on the tracing as one great pulsation, on auscultation showed, instead of two normal sounds, a double or triple number, these sounds becoming weaker and weaker until the next strong systole; so that the last sounds were sometimes imperceptible, only an uneven number being heard. These symptoms disappeared when the ascites was relieved by aspiration and re-appeared as the liquid again accumulated.

H. Schurz, ¹¹⁶_{Jan., '96} in discussing the three methods of treatment usually employed,—viz., (1) simple incision, (2) aspiration with trocar, and (3) drainage by means of a funnel,—says that in the last two methods it is important that the surface to be drained should be treated according to surgical principles. The incision should be dressed with gauze moistened with a sublimate solution,

and over this should be laid a thin cotton dressing. The patient should remain in a sitting position with feet dependent by day and by night, the escaping serum being received in rubber tissue, which will conduct it into the receptacle. The dressings should be changed every twenty-four hours and the edges of the wound anointed with vaselin.

N. Finsen ⁶⁷³_{Mar., '96} recommends a dry diet in ascites, especially in cases in which the origin is dubious. He is himself a sufferer from the affection, and has repeatedly found relief after a few days' restriction, taking only 400 or 500 grammes (about a pint) of fluids daily. The urine increased in quantity and the symptoms of oppression disappeared. The method was still more efficacious if laxatives were used, or from 3 to 5 grammes ($\frac{3}{4}$ to $1\frac{1}{4}$ drachms) of chloride of ammonium.

T. J. McKie, of Woodlawn, S. C., ¹³⁹_{Oct., '94} calls attention to the value of strychnine in ascites, commencing with $\frac{1}{30}$ grain (0.002 gramme) every eight hours and increasing the dose until the physiological action, to its full therapeutic effect, is experienced.

INTESTINAL AND OTHER PARASITES.

Examination of Fæces for Ova.

N. N. Iakimovitch, of St. Petersburg, ⁵⁸⁶_{No. 50, '94} recommends the following simple technical measures when the patient's stools are subjected to inspection immediately or shortly after discharge: A bit of fæcal matter is transferred to a glass slip with a glass rod and diluted with a 10-per-cent. solution of chloride of sodium; a cover-glass is then superposed and the fæcal matter examined microscopically, first with a low power and then with a higher one. When it is necessary or desirable to postpone the examination, the fæcal matter is spread out in a thin layer with a glass rod upon a thin sheet of transparent and colorless mica and left until thoroughly dried (without any heating); it is then wrapped in a sheet of wax or parchment-paper, put into an ordinary letter envelope, which is hermetically closed and labeled with the patient's name, age, sex, disease (if any present), time, place, etc., and kept in any convenient place. Mica preparations remain absolutely unchanged for years; they can be safely mailed to any distance by letter-post, and specimens may be carried in the pocket without any risk of breaking or spoiling the mica slides. When it is desired to examine the specimens the slides are cut into pieces the size of an ordinary object-glass, on which three or four drops of a 1-per-cent. solution of chloride of sodium and two or three drops

of glycerin have been dropped, and on which a piece of the mica slide is placed, with the faecal layer downward. In from five to ten minutes the particles are sufficiently softened and tumefied to be ready for the microscope. If ova are present they can be recognized as readily as if immediate examination had been made. If desirable, ordinary object-glasses can be used instead of the mica slips.

***Ascaris Lumbricoides* (Round-worm).**

S. N. Koneff relates ⁷⁷⁰_{No. 12, '94} ²_{Oct. 6} a case of severe reflex neurosis due to intestinal parasites in a peasant aged 18 years. The attacks presented the character of violent clonic convulsions, accompanied by loss of consciousness, insensibility of the pupil, trismus, etc. They were ushered in by globus hystericus or epigastric pain, or sometimes vomiting, and invariably made their appearance shortly after a meal. Treatment for the paroxysms failed to produce the slightest effect. Having elicited the fact that the lad had voided "a worm" five years previously, the author tried santonine (1 grain three times daily for three days) with the result that seven ascarids were expelled, after which all the symptoms described vanished, and had never recurred up to the time of the patient's discharge, five and one-half months later. A similar case is reported by Chevelev, of Kiev. ⁵⁵¹_{No. 4, '95}

Koch, ³¹⁷_{No. 8, '95} during the removal of a pyosalpinx, encountered a small abscess in Douglas's pouch, which was found to contain an ascarid. No communication with the rectum could be found. The patient died of purulent peritonitis on the third day. At the necropsy a perforation was discovered at a point where an adhesion had been separated. Two fistulous tracts led from the rectum into the cavity of the abscess where the ascarid was found. Koch believes that the abscess had burst into the rectum, the parasite afterward passing from the bowel into the abscess-cavity.

Krasnobaïeff, of Moscow, ⁵³⁰_{No. 22, '94} ²⁶_{Feb. 1, '94} describes an interesting case in which ascarids penetrated the liver during life, with a fatal result. J. Fuad ²³²_{July 15, '94} reports a case of abscess of the liver which he attributed to ascarids, having found two of these parasites in the vomited matter of the patient.

Löwy, of Vienna, ⁸⁸_{No. 24, '95} ²²_{July 17} relates a peculiar case in a child, aged 4, suffering from tabes mesenterica. A slight swelling about the navel, at first diagnosed as umbilical hernia, but gradually enlarging for three weeks, ultimately burst and discharged a piece of necrosed tissue, which was found to be a dead, shriveled ascarid. The parasite had apparently made its way from a perforation of the bowel to the surface of the body.

S. D. Read, of Melbourne, ²⁸⁵_{Sept. 20, '95} relates two cases in which an erroneous diagnosis was made, owing to symptoms, in the one case due to intestinal obstruction and in the other to hydatids, being ascribed to the presence of ascarids in the intestinal tract. In each case a round-worm had been vomited, and subsequent symptoms, due to different pathological conditions, had been considered the result of the parasite. The patient with an hydatid cyst made a good recovery, but the patient with intestinal obstruction died without surgical interference, the difficulty of diagnosis being further complicated by the fact that the bowels were moved after admission to the hospital.

Paul Wolff ⁶⁹_{No. 42, '94} met with an ascarid in the vermiform appendix, in a boy upon whom tracheotomy had been performed for diphtheria, after which suppurative swellings of the joints had supervened, followed by pneumonia, which ended fatally. During the last weeks pain on pressure was experienced in the ileo-cæcal region, extending along the centre of the ileum in the region of the vermiform process. The autopsy showed a rather large ascarid in the vermiform appendix, which was located precisely in this spot.

Blumenau, of Grodna, ⁵⁸⁶_{No. 43, '94} describes the case of an anæmic soldier who was admitted to a local hospital with symptoms of chronic gastric catarrh, suddenly complicated with vertigo and clonic convulsions of the upper and lower limbs. Half an hour later there suddenly appeared intense abdominal pain, dyspnœa, facial cyanosis, cold perspiration, cramps in the arms, and cardiac failure, the patient expiring in a few moments. At the post-mortem examination some thirteen ascarids were found in the stomach and intestines, and a large worm occluding the entire ductus choledochus and protruding from either end. The author thinks that the patient's death was due to reflex cardiac paralysis caused by movements of the worm in the duct, the patient's general debility constituting a powerful predisposing factor in the cardiac failure. Several cases are recorded in which serious disturbances in the liver were caused by the invasion of the bile-ducts by lumbricoid ascarids. At a meeting of the R. Accademia medica di Roma Marchiafava ³⁶⁰_{May, '95} reported another case. At the post-mortem examination of a jaundiced subject, who died with severe intestinal symptoms, he found the common bile duct considerably dilated, containing numerous biliary concretions, and completely occluded by a lumbricoid ascarid. The anterior surface of the liver had two smooth, cystic swellings, containing calcified fragments of worms of the same family. It is probable that these parasites lived some time in the liver before becoming encapsulated.

Irving M. Snow, of Buffalo, ^{May 25, '95} reports a case in which membranous enteritis was associated with ascarids, and alludes to a similar case, reported by another observer, in which, fourteen days after the discharge of the casts, lumbricoid worms were evacuated.

Tæniæ (Tape-worms.)

Continuing his researches on the relation of the fish consumed by the population of St. Petersburg to the *Bothriocephalus latus*, A. von Schroeder ⁵⁸⁶ _{No. 15, '95} examined twenty-nine perches, finding the cysticerci of the identical species in thirteen of them. The length of the fishes varied from 9 to 16 centimetres, averaging 11; that of the cysticerci varied between 0.2 and 25 millimetres. In all the thirteen perches the parasites were present in muscles alone.

According to the author's theory, both the pike and the perch are directly infected through swallowing the onkospheres of the bothriocephalus. He adds, further, that in each species there occasionally occur psorospermia situated in the muscle-tissue alone.

Babès, of Bucharest, ²⁰ _{B. 141, p. 204, '95} has found the larvæ of bothriocephalus in pike in his own neighborhood, and has been able to determine the presence of the eggs in anæmic patients, and the worm itself in persons who have died with symptomatic signs of pernicious anæmia. He therefore concludes that, besides Switzerland and the coasts of the Baltic, there is a third place of origin for the bothriocephalus,—namely, Roumania.

Adolf Lutz, of Brazil, ⁵⁰ _{B. 16, H. 2} writes concerning the varieties of tape-worms found in man known as *T. nana* and *T. flavopunctata*, and claims to have been the first to discover, in St. Paolo, Brazil, the presence of the latter variety in a child 2 years old. The parasite was passed after the use of santonine, and probably had its origin in rats, since the author was frequently able to find it in *Mus decumanus*. He also describes the case of a child, 2½ years old, suffering from irregular attacks of fever, bowel trouble, and nervous symptoms, and in whose stools he found the eggs of a tape-worm, which he considered to be those of the *T. nana*. On administration of extractum filicis the worm was passed. A second case, that of a little girl 4 years old, voided quite a number of tæniæ. This *T. nana* was also discovered in rats; so that they must be considered as intermediate hosts. The author is inclined to believe that these parasites were introduced into Brazil by emigrants from Italy, where they are much more frequent.

Lebelle, of Aubusson, ²¹² _{June 25, '95} relates a case in which ten tape-

worms were passed in two stools. This observation, interesting because of its rarity, is, however, not unique, Béranger-Féraud having alluded to instances in which as many as fifty-seven tæniæ were voided by one individual. He therefore thinks it wise not to affirm the absence of worms in the intestine after having discovered one in the stools.

G. Wlaew⁵⁸⁶_{Nos. 25, 27-29, '04} studied the influence of the *Bothriocephalus latus* in the etiology of pernicious anæmia, and endeavored to ascertain whether the body of the *Bothriocephalus latus* in itself contained any poisonous substances. An excreted *Bothriocephalus latus* was washed with sterilized water, divided, and placed in a 1-per-cent. alkaline sterilized solution. During a period of five days this was daily heated from 55° to 70° C. (131° to 158° F.) over a water-bath. Intra-venous injections of the filtrate were administered to rabbits and doves. Upon the supposition that the poisonous substance might be a toxin of albuminous nature, an effort was made to obtain the latter by acidulating the alkaline filtrate with acetic acid and afterward adding common salt up to the point of saturation, a considerable precipitate resulting, which was filtered two days later and dissolved in a watery alkaline solution. After acidulation with HCl to the point of neutral reaction this was also used for injections, which, however, as in the previous case, did not occasion any change whatever.

In consideration of these facts, as well as the supposition that the bothriocephalus does not always prove dangerous to its host, it would seem unjustifiable to admit that injurious effects are induced by a poison produced by the bothriocephalus or by its decomposition products. Up to the present time, also, it has been shown (the author quotes twenty-four cases, of which five are personal ones) that the *Bothriocephalus latus* in the majority of cases produces injurious effects and leads to pernicious anæmia only in young subjects whose organism is still in course of development. Its early diagnosis and removal is therefore of the greatest importance in such cases.

Israel, in discussing Wolff's case,⁶⁹_{No. 42, '04} states that during the extirpation of the vermiform appendix in the case of a nurse at the Jewish Hospital, two living joints of a tape-worm were found in the organ, which was considerably enlarged.

Szèkèrès⁶²²_{No. 43, '04} reports a case in which a *Tænia echinococcus* was removed from the spinal cord. The patient, who was 32 years old, of medium size and well developed, had noticed, twelve years before, while he was working as a butcher, a gradually growing, painless swelling upon the vertebral column. During his military service, while in the infirmary for some other disease, this

swelling was once punctured, but was afterward left undisturbed. In 1892 severe pain began to manifest itself in the right side of the spine, which extended as far as the feet; in 1893 obstinate constipation set in, which increased to the point of absolute retention, and at the time of the patient's admittance to the hospital there was total anæsthesia and motor paralysis. Examination showed a slightly-movable swelling just under the eighth thoracic vertebra, eighteen centimetres long and eight centimetres wide. The skin over the swelling was normal. Upon opening, a great quantity of echinococcous cysts were emptied, varying in size from that of a millet-seed to a hazel-nut. After the spontaneous discharge of a piece of necrosed bone over one-half centimetre long, complete recovery took place.

Ijima and Kurimoto <sup>2036 764
p.371, 94; Dec.</sup> have recently found a very large tape-worm in a man which differs radically from any form ever recorded for the human species, but which agrees in certain important anatomical characters with some tape-worms reported in seals (*Phoca*).

The patient who harbored this parasite had lived for the greater part of his life on the sea-board. He was born in the province of Hizen, and had never been in any other part of the country. After suffering for five years at irregular intervals with attacks of vertigo and colic, exhibiting also a progressive anæmia, he passed a fragment of a tape-worm. The attacks of colic returned and increased in violence. After a dose of anthelmintics he passed more of the parasite and the symptoms disappeared.

The head of the worm was not found, but, from the general structure of the segments examined, it may be concluded that there are two groove-suckers (one dorsal and one ventral), agreeing approximately with the head of *Bothriocephalus latus*. The worm is estimated at about 10 metres in length, the broadest segments measuring 25 millimetres in breadth when fresh and 14 to 16 millimetres when preserved in alcohol, and are remarkably short, the largest measuring only 0.45 millimetre long. The general structure of the genitalia agrees with that of *B. latus*, but, instead of there being only one set in each segment, two sets are found, one on each side of the median field. Two longitudinal grooves are seen on the ventral surface of the worm, each groove containing in each segment the openings (penis, vagina, uterus) of one set of genital organs. The egg is oval, 63μ by 48 to 50μ , with a thick, brown shell.

Treatment.—According to Dujardin-Beaumetz ^{Feb. 16, '96} the best of all tænicides is the pelletierine of Tanret. His method of prescribing is as follows: The patient's bowels should be thoroughly

cleared out toward evening by means of a copious enema; and, if he cannot do without supper altogether, the meal should be as light as possible, consisting chiefly of milk. The next morning, while fasting, 9.5 grammes ($2\frac{1}{4}$ drachms) of sulphate of pelletierine should be given in solution, with 0.50 gramme (8 grains) of tannin, and ten minutes after swallowing the dose the patient should drink a large glassful of water. In three-quarters of an hour he should conclude the treatment by taking 50 grammes ($1\frac{1}{2}$ ounces) of castor-oil. Pelletierine is not a suitable vermifuge for children, for whom the subjoined formula is recommended:—

- R Pumpkin-seeds, newly hulled,
Sugar, āā 40 grammes ($1\frac{1}{4}$ ounces).
Orange-flower water, sufficient to make a paste.
M. Sig.: The whole to be taken, fasting, in the early morning.

Roberts Bartholow, of Philadelphia, ⁹_{Oct. 6, '04} recommends papain, in doses of 10 grains (0.65 gramme) three times daily.

C. Mangold ¹³³_{Dec. 22, '04} gives the results, from the medical clinic at Tübingen, in the treatment of *Tænia solium* and *Tænia saginata*. Since 1881 ethereal extract of male fern has been exclusively prescribed, 120 persons (48 men, 61 women, and 11 children) being thus treated for *T. saginata*; 99 were successful. In 78 cases the head of the worm was found; the other 21 cases reported that since treatment they had been free from any symptoms. Among the remaining 21, in which the head was also not found, 8 stated that, after the treatment, sections of the worm had again been found; 3 cases were treated during the three months prior to the report, but the head had not appeared; of the remaining 10 cases the results of treatment could not be definitely ascertained. In the whole number there were thus at least 84 per cent. of cures of *Tænia saginata*. In one instance three heads were passed after one treatment, and in 2 cases two heads were found. The dose of 10 grammes ($2\frac{1}{2}$ drachms) of the extract of male fern was never exceeded. No deleterious accidents occurred. Of *Tænia solium* 3 cases were treated in men and 3 in women,—all successfully. In the case of one man 6 worms were passed and in another 4, both after one treatment. This number, though unusual, is small in comparison to the cases of Kleefeld and Küchenmeister, in which 41 and 33 tæniæ, respectively, were reported to have been found in one individual.

Anchylostoma Duodenale.

C. H. Williams, ²_{Feb. 2, '06} in discussing the frequency of *Anchylostoma duodenale* in Madras, said that of fifty post-mortem examinations this parasite was found in twenty-six (52 per cent.),

and, while the parasite was very commonly present among the poor who came to the hospital in Madras, any actual disease produced by it was rare. Certain ulcerative lesions in the upper part of the small intestine might have been caused by it in one case, and, possibly, certain cirrhotic lesions of the liver, pancreas, and kidneys in others. Tinozzi⁵⁸⁹_{Nov. 90, 91, '94} reports the first case observed in Naples, and later⁵⁸⁹_{p. 207, '94} adds three more cases in which anæmia was a prominent characteristic. Beaven Rake²⁴⁷_{Nov., '94} has found that in anchylostomiasis the average percentage of iron in the liver is less than in other diseases, and is very much less than the average percentage in pernicious anæmia. Thus, in anchylostomiasis it is 0.1 per cent.; in other diseases, 0.12 per cent.; and in pernicious anæmia, 0.7 per cent. The iron in the spleen is scarcely affected in anchylostomiasis; the intense anæmia associated with this condition is simply due to loss of blood from the intestine, and is not caused by any toxic blood-destruction in the liver.

Treatment.—Britto, of Rio Janeiro,¹¹⁵³_{Nov. 16, '95} recommends thymol, which he has always found rapid and successful. The day preceding the treatment the patient is put on milk diet; in the afternoon he is given

R Powdered senna, 2.00 grammes ($\frac{1}{2}$ drachm).
 Calomel, 0.50 gramme ($7\frac{1}{2}$ grains).
 Sig. : To be made into 4 wafers, 1 to be taken every hour.

The following day, while fasting, thymol is taken, 6 grammes ($1\frac{1}{2}$ drachms) in 9 wafers, 3 every two hours. This medication causes copious liquid stools, carrying with them the anchylostoma and their eggs. If these dejections are long in appearing, 30 grammes (1 ounce) of castor-oil may be prescribed. The fæcal matter is examined a few days later, and if it still contain eggs the same treatment is again commenced. In most cases all traces of the parasites disappear after the second exhibition of thymol; the patient is at once relieved and the alarming symptoms caused by the anchylostoma diminish and rapidly disappear.

Distoma.

H. de Gouveá, of Paris,²⁰⁰⁰_{95; Apr. 27} records the case of a French naval officer, serving on the American Atlantic coast, latterly in Brazil, who after a trifling fever began to experience pain at the base of the left lung, associated with localized moist râles, cough, and slight hæmoptysis. The cough was spasmodic and returned with the utmost regularity three times every day in severe paroxysms, each paroxysm being followed by hæmoptysis. During the third week of the illness the patient coughed up a living distoma

measuring two centimetres by one-half centimetre. The parasite was diagnosed *Distoma hepaticum*, a diagnosis subsequently confirmed by Leuckart. This is the twenty-fourth recorded case of this form of distomiasis in man, and the first in which the parasite was lodged in the lungs. The author points out that it might be possible to arrive at a correct diagnosis by microscopical examination of sputum in any similar case, the eggs of the parasite being quite characteristic.

Railiet ¹⁴_{May 8, '96} describes a variety of distoma found in the liver of bullocks in Senegal, differing in some points from the common distoma. It is a very long worm, having a scarcely visible cephalic prolongation and a posterior suction apparatus. The eggs have an especially distinct appearance, being very different in size from those of ordinary distoma. Leuckart has already noted a distoma greatly resembling this, and has lately published a case in a man who had lived in Senegal, the parasite having caused serious pulmonary symptoms.

Schellenberg ⁵⁰_{Aug. 24, '96} has found the distoma in the muscle of frogs.

Knoch ²⁰³⁸_{'96} published a comprehensive study of the topography of the excretory apparatus and the general nervous system of the *Distomum lanceolatum*; Looz, ²⁰³⁷_{'94} an octavo volume on the structure of the *Distomum heterophyes* and the *Distomum fraternum*; and Rhumbler, of Göttingen, ⁵⁰_{May 4, '96} remarks on the migration of the *Distomum cylindraceum*, Zed. Henry B. Ward, of Lincoln, Nebraska, ⁵⁰_{Mar. 15, '96} reported a second case of *Distoma Westermanni* observed in the United States, and a study of the feline distoma.

Trichina Spiralis.

Askanazy ²⁰_{B. 141, H. 1, '96}, ⁸¹⁴_{Oct. 1, '96} gives the result of four years' study of the subject of trichinous invasion. That trichinosis is the result of the introduction of trichinous meat into the intestinal canal of the newly-infected animal must be considered as established. In this location the trichinæ, freed from their enveloping capsules by peptic action, within a few days grow to male and female intestinal trichinæ. The sexually-ripe worms copulate, and within the genital tube of the mother-trichina develop numerous living embryos. From this point on our knowledge of the manner in which the embryos finally reach the muscles is not positively known.

According to generally accepted views, these embryos are born exclusively within the intestinal lumen. From this location, in order to gain access to the muscular structures, the embryos must in some way penetrate the walls of the intestine. Leuckart, who

advocated the theory that the embryos actively penetrate the intestinal walls, stated that no one had succeeded in observing the passage of the young worms through the intestinal mural structures. His view is that the embryos, by virtue of their independent activity, wander from the peritoneal cavity by way of the loose connective tissue to the muscular structures. Passage by way of the lymph- and blood- channels receives but occasional and then only passing notice. The repeated detection of trichinae in blood-coagula and mesenteric glands led Fiedler to conclude that the usual route the trichinae take to reach the muscles is the lymph- and blood-stream, and that but few migrate directly by way of the cellular tissue and muscle. Fiedler's views, however, did not enjoy the favor they deserved.

In the experiments of Askanazy, at three meals—morning, afternoon, and the following morning—rabbits were fed large quantities (30 grammes—1 ounce) of trichinous flesh. From animals which had died of the trichinosis thus induced pieces of the intestinal canal were removed as soon as possible; in the living animals portions of the intestine containing the worms were excised under ether narcosis. The intestinal regions affected corresponded usually to the duodenum and jejunum. These parts were distended; the serosa and the neighboring mesentery were strongly congested, the small veins especially being intensely filled with blood. A glassy, colorless, whitish-gray, or light-yellow colored tenacious mucus filled the intestinal lumen and exuded upon incision of the parts. The mucous contents and the injection of the intestinal walls gave to the dilated intestinal loops a peculiar, rosy transparence,—an appearance which at once directed attention to the affected localities. From such localities cylindrical, unopened portions of the gut, about one-half to one centimetre long, were excised in large numbers, and, with the intestinal contents intact, placed in Fleming's acid mixture. After thorough hardening, the tissues were allowed to remain in celloidin for weeks, to insure perfect infiltration. Sections were stained in safranin.

Description of Plate.—Fig. 1. Section of a trichina spiralis, containing embryos located in the epithelium of a villus. A second section, showing three ovules lying free in the lumen of the intestine, to the right.

Fig. 2. *Trichina spiralis* burrowing into the mucous membrane.

Fig. 3. *Trichina spiralis* curled up in the lumen of a central lacteal vessel of a villus. (Cut through five times.) The epithelium of the villus is cast off.

Fig. 4. *Trichina spiralis* located in the lumen of a central lacteal vessel of a villus. (Severed four times during the section.) To the left, alongside the villus deprived of its epithelium, is a section of the posterior portion of the trichina which still lies free in the lumen of the intestine. In the central lacteal vessel on the right, alongside of the trichina, a free embryo, folded up, may be seen.

Fig. 5. A free embryo located in a lymph-vessel of the mucous membrane.

Fig. 6. Two free embryos in a lymph-space of the submucosa. Below are the two muscular layers and the serosa. On the right is a portion of a small artery.

Fig. 1.



Fig 2

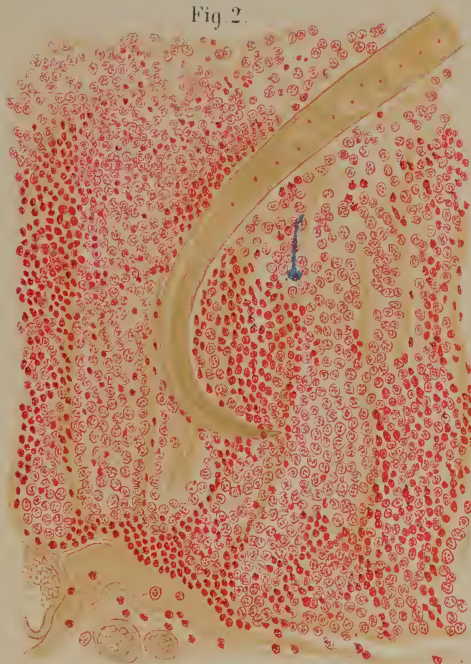


Fig. 3.

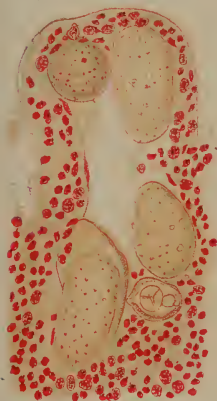


Fig. 4.



Fig. 6.

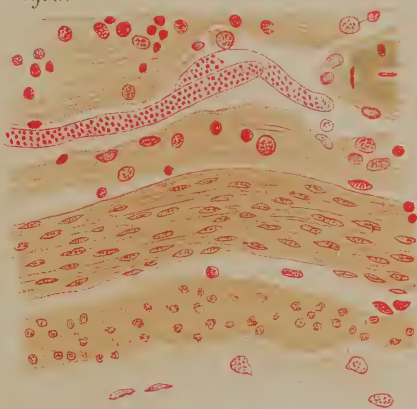


Fig. 5.

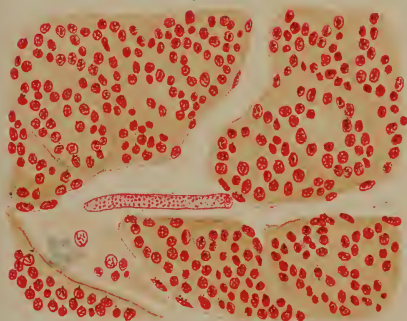


Fig. 7.

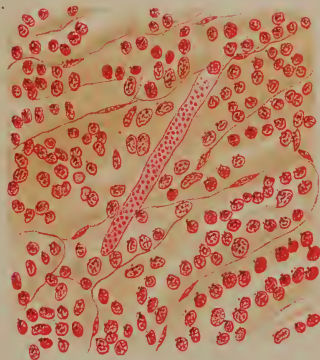
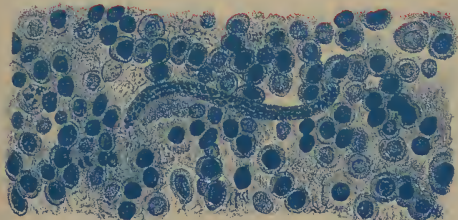


Fig. 8.



Trichinosis. (Askanazy)

Virchow's Archiv.

Fig. 7. An embryo lying crosswise in the tissue of the mucous membrane.

Fig. 8. A young embryonic trichina in a mesenteric gland, the lymph-cells of which are partially necrotic.

When a large series of sections had been examined intestinal trichinae were observed, which had nearly penetrated the mucous membrane of the intestine. These phenomena were seen in an animal which had died on the seventh day after feeding with infected flesh.

The method of invasion, as observed by Askanazy, is as follows: At first it can be seen that the female intestinal trichinae are at many points in close and intimate contact with the mucous membrane, especially with the villi. They often encircle the latter in spiral form, leaving deep impressions in the epithelial covering. The parasites now actively enter the villi. It is the female intestinal trichinae only which penetrate the tissues of the intestine. They enter the villi at the apex, from the side or base; sometimes the mucous membrane itself is pierced. In transverse sections a circular canal formed in the epithelium is observed inclosing the body of an intestinal trichina; inside the latter is occasionally seen the genital tube filled with ova or embryos. As the epithelium is higher than the cross-section of the trichina, the worm is still surrounded, above and below, or on both sides, by the cell-protoplasm. The nuclei of the neighboring epithelia are pushed aside with concave impressions.

The worm now enters the deeper tissues,—into the connective tissue of the villi. From here it enters the central chyle-vessel of the villus. The chyle-vessel is distended, and may reach a diameter of seventy or eighty millimetres. The connective tissue of the villus is compressed to a narrow seam. The epithelia of the chyle-vessel are usually well preserved, but occasionally they are exfoliated and lie in the lumen mixed with finely-granular lymph and a few lymphocytes. As many as forty parasites may lie within the central chyle-vessel, and some may be seen in the lumen of the lymph-vessels branching from the base of the villus. The intestinal trichinae also make their way through the mucous membrane between the villi, and, as in the villi, migrate toward the lymph-vessels. It is seen, therefore, that the parasites occur in the lymph-vessels of the whole mucous membrane to the muscularis. In addition, numbers of embryos may be observed lying free within the lumen of the chyle-vessels situated in the mucosa, the submucosa, between the muscle-lamina, and in the subserosa. In spite of the fact that great numbers of sections were examined, free embryos lying close to intestinal trichinae located within the intestinal lumen were seen by Askanazy but six times.

From what has been said, it is plain that the views previously held upon this subject, and according to which all embryos were born within the lumen of the intestine, are incorrect. On the other hand, it may safely be concluded that the intestinal trichinæ actively penetrate the villi and mucous membrane of the intestine; that the embryos are deposited within or near the lymph-vessels, and from here gain admission to the muscles through the circulation. Some may go by way of the connective tissue, but by far the greater number enter in the manner just described.

After a number of feeding experiments carried out upon young cats and rabbits, Geisse³²⁶_{B.56,p.150,'96;}⁸¹⁴_{Nov.1} was unable to confirm the statements that the adult female intestinal trichinæ migrate from the intestinal lumen by way of the lymph-channels of the mesentery to the lymph-glands, where they bring forth their young. On the contrary, the intestinal trichinæ appear by preference to take up their abode in the lumen of the villi of the large and small intestines, where they deposit their embryos. Their location enables them to resist all efforts at their dislodgment by means of purgatives or anthelmintics. The distribution of the embryos from the intestine to all parts of the body occurs chiefly by means of the vascular system, though, to a slight extent, an active migration of the worm through the intestinal wall, abdominal cavity, and the surrounding connective tissue also takes place.

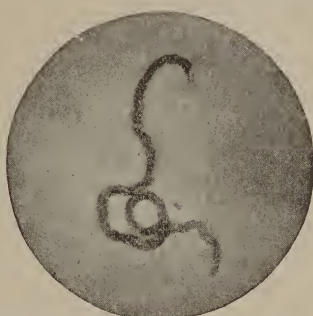
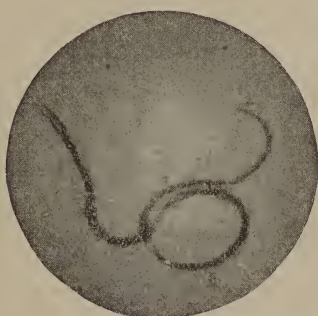
In a study of trichinosis in the human subject, F. J. Thornbury²⁰⁰³_{Oct.10,'04} found 14 per cent. of a series of cases in the dissecting-rooms of the University of Buffalo invaded by this parasite. When a quantity of trichinæ not sufficient to produce death is ingested, they bore into the muscles even of remote parts; and he believes that many cases of chronic muscular rheumatism are due to the lodgment of this parasite in the muscles. He has frequently observed trichinæ in adipose tissue and had them photographed in that position. Encapsulation here is very imperfect.

Ch. Wardell Stiles, of Washington,⁵⁰_{Nov.3,'04} writes that the European authors who state that it is customary for the Chicago, Omaha, and other large American pork-packers to feed offal to swine at their abattoirs, and spread the disease in that way, are entirely in error. This custom of offal feeding does exist among small local country butchers, but not among packers who ship pork to Europe. It is, in fact, rare that hogs are allowed to remain over forty-eight hours in the stock-yards of any packing-house before being slaughtered, and during this time they are fed on grain. This delay of twenty-four to forty-eight hours is, of course, necessary to allow the hogs to recover from their journey on the cars, but in no way does it render them more trichinous, as the muscular stage of the

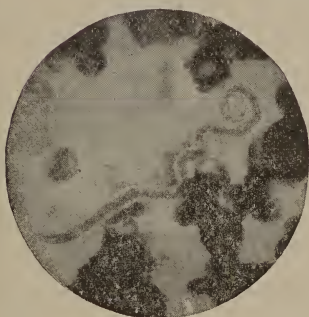
disease could not develop in so short a time, even if they became infested with the parasites after reaching the yards.

Filaria.

Firket⁵²_{June 27, '96} studied the blood of about sixty negroes belonging to different tribes of the Congo States. In the majority of the subjects he was able to determine the presence of embryos of filaria, several characteristics of which ally them to Manson's *Filaria perstans*. The parasite observed, however, presented notable differences in point of size, which leads to the supposition



LONG FILARIE. (FIRKET.)



SHORT FILARIE. (FIRKET.)

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of the existence either of a variety of species or of successive stages of evolution. The health of the individuals having these parasites did not appear to be at all affected,—a fact often observed in other filariæ (Manson's *Filaria nocturna*). Although the length of these worms is comparatively great (100μ to 200μ), their diameter is less than that of a red corpuscle; so that they can pass through the capillaries. It is easy to understand, however, that a worm of this size, if it enter a narrow capillary when doubled upon itself, may be stopped and induce embolus by causing the various accidents which follow vascular obliterations.

This would explain the different pathological symptoms which are united under the name of filarial diseases, especially chyloform accumulation, elephantiasis, etc. Whatever may be the exact mechanism, these affections are seen in the Congo, as is likewise sleeping-sickness, which has also been attributed to filaria. The parasites remain in the blood for a long time after the original infection. The author found them in the blood of a negro from the Congo who had been living in Belgium for six years. He has, however, never found them in the blood of white persons, which is explained less by race immunity than by hygienic conditions and alimentation.

Only one observation has been so far published of filaria in the anterior chamber of the human eye, reported by Barkan, of San Francisco. Lecompte ⁶⁸⁴_{Oct., '94} publishes another case, in which he extracted a dead filaria from the anterior chamber of the eye of a young girl from the Congo living at the time in Belgium. The worm moved rapidly about in the aqueous humor. The eye only seems to have become inflamed (iritis) after the death of the worm, which then formed, doubled up on itself, a small white mass at the bottom of the anterior chamber. It was extracted through an opening in the lower portion of the cornea.

Arthur Neve, of Kashmir ⁶_{Feb. 16, '95} observed a case in India, in a horse, the filaria, about an inch and a half long, moving rapidly about in the anterior chamber of the left eye.

At the Indian Medical Congress, Surgeon-Major J. Maitland ²_{Feb. 2, '95} called attention to the prevalence of filarial disease in India, particularly along the coasts. He stated that he had recently found the parental form of *Filaria nocturna* in the course of operations in three cases, ²_{Apr. 21, '94} and concluded that, with antiseptic surgery, there was no danger attending removal of filarial lymphatic varices; but he deprecated excision in all cases in which there was evidence of extensive varicosity of a large part of the lymphatic system, and in cases in which the disease was giving rise to no inconvenience. The existence of chyluria and the presence of chylous fluid in the varix, therefore, contra-indicated operation. With this proviso he advocated excision in cases in which the lymphatic glands were enlarged and varicose, and in which filariæ were found in the blood; in cases in which the glands were enlarged and varicose and in which no filariæ were found in the blood; in cases in which filariæ were not found in the blood, but in which inflammation was suddenly developed in a part in which there was reason to believe parent filariæ might be lodged.

Austin Flint ¹_{June 15, '95} recommends methylene-blue in filariasis,

basing his advocacy on experience in one case of severe chyluria. In this case prior to treatment filariæ were so abundant that "in each field of the microscope an average of ten embryonic filariæ" were found. On March 5th 2 grains (0.13 gramme) of methylene-blue were given and repeated at intervals of four hours during the day. The same evening only two filariæ were found in four slides, and these were sluggish and stained by the dye. The urine had become clear and of a characteristic greenish blue. Treatment was discontinued. Blood examined on March 8th and 11th contained no filariæ. On March 12th the urine had lost its blue color and had again become milky. During the night of March 13th filariæ were found in the blood in great abundance; at the same time it was observed that the parasites showed a considerable amount of aniline staining and that their movements were sluggish. On the following day methylene-blue was again given; on the third day thereafter, on examining the blood, several dead and disintegrating filariæ were found deeply stained. The urine had also cleared again. At the end of five days the treatment was discontinued, and, although the blood was frequently examined subsequently, no filariæ could be found and the urine remained normal.

Crombie, of Calcutta, ⁶_{Oct. 13, '94} has shown that 10 grammes (2½ drachms) per diem of thymol, given for three successive days, has not availed to cause the disappearance of the embryo filariæ from the blood, contrary to what has been asserted by others,—viz., that daily doses of some fraction of a gramme of this same drug, taken for a certain number of days, were sufficient to cure filarial disease radically.

Trichocephalus Dispar.

The prevailing impression that this parasite is always harmless is contradicted by a case reported by Boas, of Berlin. ¹⁴_{Mar. 31, '95} The patient was employed on canal-work, being obliged to remain in water up to the knees, and eating without taking the precaution of washing his hands. For seven or eight months he had lost his appetite and had from four to six liquid stools each day. He entered the hospital with symptoms of gastro-enteritis. The abdomen was sensitive to pressure, especially in the cæcal region, and from four to six trichocephali were found in each stool. It was found impossible to free him from these parasites, as the trichocephalus firmly implants its cephalic extremity in the intestinal mucous membrane and remains sheltered under one of its folds.

Dracunculus Medinensis (Guinea Worm).

Manson ²²⁴_{Sept. 7, '96} states that the views formerly held with regard to the way in which this parasite gained access to the human body

were erroneous. The Guinea worm parts with her embryos before she quits the human host, and this process can be provoked by simply pouring a little cold water on the limb in the neighborhood of the Guinea-worm ulcer. The water seems to act as a stimulant to the worm; the latter contracts and expels the young through its mouth, the uterus being prolapsed for an inch or two. In this way Manson obtained a large supply of embryo Guinea worms and repeated Fedschenko's experiments with *Cyclops quadricornis*, confirming the results of the Russian naturalist and somewhat extending them, and showing that the English cyclops was an efficient intermediate host of this parasite. The young Guinea worms, on escaping from the uterus of the parent, swim about in the water until they encounter a cyclops. They then attack the crustacean, boring their way between the ventral plates until they get into the body-cavity. Here they move about quite freely, as many as ten or twenty lying together in the body-cavity, and not apparently inconveniencing the cyclops. The embryo now casts its transversely striated integument along with the swimming tail, the latter giving place to a short conical stump. Later a second molting takes place, eventuating in a tripartite tail, increase of size, and a somewhat more elaborate alimentary canal. The parasite inclosed in the cyclops is then transferred, probably in drinking-water, to the human stomach. From the stomach, after digestion of the cyclops, the Guinea worm is supposed to work its way into the connective tissues of its host, and in the course of time to attain sexual maturity. Manson deprecates interference with the Guinea worm until she has emptied her uterus of embryos. He pointed out that she then tends to come out spontaneously. He also thinks that the new treatment by injection of perchloride-of-mercury solution in the neighborhood of the Guinea-worm sore may be useful in killing the worm and procuring her aseptic absorption.

Charles Forbes²³⁹_{Oct. 1, '94} uses precipitated sulphur, preferring it to sublimated sulphur because it is more finely divided and therefore more readily absorbed. In about thirty cases he has used compound-sulphur tabloids with most gratifying success, giving one tabloid three or four times a day. The author agrees with Huntly that chloroform may be given and complete removal of the worm carried out. Huntly, however, accords the preference to local anæsthesia by means of injections of cocaine hydrochlorate, of which $1\frac{1}{2}$ grains (0.1 gramme) usually suffice to complete an extraction painlessly, while Forbes finds many drawbacks to all hypodermatic injections into inflamed areas. Vesey Davoren²_{Oct. 27, '94} tried Emily's treatment in two cases of Guinea worm with good

results. The method consists of hypodermatic injections of 1 in 1000 solution of perchloride of mercury in several places around the bleb.

Treatment of Parasitic Disorders.

The toxicology of vermifuges has received much-needed attention during the year. Combemale, of Lille, ¹⁴_{Apr. 21, '96} states that vague nervous troubles, so often seen in children, which, without precise diagnosis, are attributed to worms, are often due to the abuse of santonine.

A series of experiments demonstrated that, as soon as its presence is shown in the urine, there is nervous depression and, therefore, danger. From a clinical point of view this symptom, rather than xanthopsia, should be used to determine santonine intoxication. If every exhibition of santonine were followed by a purge to evacuate the stunned ascarids, failures would be rare and there would, therefore, be less tendency to force or repeat the doses; it is to this practice, indeed, that all the trouble may be attributed.

Gross ³¹_{Mar. 20, '96} relates a case of blindness due to a vermifuge. A man, aged 44 years, after a dose of castor-oil, took thirty-two capsules of a vermifuge. In the evening he fainted, and when admitted to the hospital was found to be suffering from mydriasis and total want of light-perception, but without visible change in the fundus oculi. Symptoms of atrophy of the optic nerve subsequently appeared. Each capsule contained ethereal extract of male fern and pomegranate-root bark, of each, 0.25 gramme (4 grains). As experiments on animals show, it is especially dangerous to take extract of male fern at the same time as castor-oil, as the filicic acid dissolves much more readily.

Masius ³_{July 3, '96} witnessed two cases of more or less complete amaurosis following the administration of ethereal extract of male fern in doses of 8 to 10 grammes (2 to 2½ drachms), repeated for several days in subjects with anchylostomiasis. To determine whether the amaurosis was due to the extreme anæmia caused by the intestinal worms or to the remedy given, the author experimented on dogs and observed that, of four dogs to whom ethereal extract of male fern was administered, two shortly showed signs of undoubted blindness. It is therefore certain that the amaurosis which is sometimes seen after the use of this drug is due to the absorption of the toxic principles contained in it.

Van Aubel ³_{July 3, '96} recalled Gerhardt's observations in which he mentions the amaurosis following the administration of 10 to 15 grammes (2½ to 4 drachms) of ethereal extract of male fern.

Eichhorst also mentions it in his treatise on internal pathology. Poulson, of Strasburg, recently demonstrated that, among the substances extracted from male fern (crystallized filicic acid, amorphous filicic acid, volatile and resinous essential oils), the crystallized filicic acid, which is anhydrous, has no tænistige nor toxic properties, whereas amorphous filicic acid possesses these qualities to a high degree.

Although Grawitz⁴_{No. 52, 94} has had a large number of patients with tape-worm under his care, he has not had the opportunity of seeing a case of the severe form of poisoning. On the other hand, he has noticed jaundice appear in the majority of the cases treated with *felix mas*. This is especially true of the cases treated recently. As already stated, filicic acid is much more readily absorbed, and therefore more apt to give toxic symptoms, when it is dissolved in ethereal or fatty oils; and since, during later years, *felix mas* was given in conjunction with castor-oil, the author regards this circumstance as the cause of the more frequent occurrence of jaundice. The author, however, admits that it is possible that the frequent observation of jaundice may be due to a more careful study of the after-effects of the drug. Grawitz's own observations lead him to believe that in only a small minority of the cases can we regard, with any degree of certainty, a catarrhal condition of the intestinal mucous membrane as the causative agent. In the majority of the cases he could find no reason for supposing an inflammatory condition of the duodenum, but rather looked for the cause in the blood itself. It was while making systematic examinations of blood that he first noticed the diminution of the red and of the white blood-corpuscles, as well as a diminution in quantity of the solid, residual substance of the blood and serum, after the administration of *felix mas*.

Aurel Schmitz³⁶⁶_{V. 39, Nos. 2, 3} used naphthalin in 46 cases of oxyurias. His method of employing the drug is as follows: After the bowels have been thoroughly cleansed by means of a mild purgative a dose (0.15 gramme—2.4 grains—for a child aged 1½ years, up to 0.4 gramme—6 grains—for a child of 12 years) is given midway between meal-hours, mixed either with a little sugar or in a capsule. This is repeated twice daily till four doses have been taken. Then a pause of eight days is made, and, if necessary, the course is repeated. A third course may be given after an interval of fourteen days. It is very important that, during the administration of the drug, fat, as far as possible, should be withdrawn from the dietary, as its presence favors the absorption of the drug. If there be constipation, mild purgatives should be given after each course of the drug. With these precautions he says the drug is

well borne. In 26 of the 46 cases treated one course proved sufficient. The writer thinks that, given in this way, naphthalin is less dangerous than santonine.

Prospero Sonsino, of Pisa, ^{Dec. 1, '94} has had numerous brilliant successes from thymol in the treatment of anchylostomiasis, but in some cases—rare, it is true—he has found difficulty in ridding the intestines of the parasite, even by means of this remedy. In one case the administration, three times daily, of doses of 4 grammes (1 drachm) brought away, in all, thirty-one anchylostoms; nevertheless the stools still contained eggs of this parasite in as great abundance as they did previously to the thymol treatment and as plentifully as they are found in the stools of patients in which thymol brings away hundreds of anchylostoms. He argues that this may be due to the circumstance that a certain number of worms remain still hidden in the walls of the intestine or under the folds of the valvulæ conniventes in such a manner that the thymol may pass them without displaying its deadly action on them, or that, as they are enveloped in an extraordinary abundance of tenacious mucus, they are shielded from the action of the drug. These rare cases of failure must not detract from the reputation of thymol as an admirable remedy in the treatment of anchylostomiasis. While expulsion of anchylostoms is the rule with thymol, this drug acts on other species only exceptionally, and in the greater number of cases it altogether fails to effect their expulsion. For the expulsion of *Ascaris lumbricoides* and *Oxyuris vermicularis* Sonsino cannot trust to thymol any more than he can to other ordinary remedies in use, such as santonine (or, better, the new drug, santoninissina) in the case of the former and the enema of quassia amara or vinegar in that of the latter.

With regard to the method of administering thymol, the author has found that the best way to give it is in powder, inclosed in wafers. He has not found the tabloids of any advantage, because they must be given in too great numbers for conveniently administering doses of several grammes, and the direct contact of the drug with the mouth may prove to be hurtful, seeing that it is an acid remedy.

Miscellaneous Parasites.

Protozoa.—In a male patient, aged 27 years, formerly living in Texas, and suffering while there from malarial hæmaturia, Dock, of Ann Arbor, ^{Dec. 22, '94} found in the urine an organism very closely resembling, if not identical with, the *Trichomonas vaginalis*. The man, whose veracity there is no reason for doubting, denied coitus. Only three cases—those of Küntsler, Marchand,

and Miura—are said to have been thus far described in which the freshly-passed urine of the male contained this parasite.

A case of *Strongylus gigas* was reported by H. L. Kampen, of Kirkwood, Ill., ¹⁹²_{July, '95} and another by P. Moscato. ⁵⁹⁶_{Oct., '94} Among the papers presenting collateral interest published during the year were those of A. Loos, of Leipzig, ⁵⁰_{Aug. 24, '95} upon the *Strongylus subtilis*, observed in Egypt; F. Zschokke, of Basle, ⁵⁰_{May 21, '95} upon the *Davainea contorta*; Wandolleck, of Berlin, ⁵⁰_{May 4, '95} upon the *Pyrosoma bigeminum*; Ch. Wardell Stiles, ⁵⁰_{Apr. 16, '95} on a double-spored cestode with occasional single spores; Seitaro Goto, of Tokio, ²⁰³⁶_{V. 8, No. 1, '94} studies on the ectoparasitic trematodes of Japan; Kampmann, ²⁰³⁹_{'94} on the valve system of excretory organs of trematodes; Schuberg, ²⁰⁴⁰_{B. 10, No. 2, '95} on the histology of the trematodes.

DISEASES OF THE KIDNEYS, BLADDER, AND ADRENALS; URINALYSIS.

BY ALFRED RUBINO, M.D.,

ASSOCIATE EDITOR,

NAPLES.

DISEASES OF THE KIDNEYS.

Albuminuria.

Pathology.—[The question as to the genesis of the albuminuria of renal disease has not yet been definitely settled. While most authors hold that it is due to disturbance of the glomerular circulation or to structural changes in the kidney-tissues generally, Semmola argues that the primary change in Bright's disease is an altered condition of the proteids of the blood-plasma to which structural changes in the kidney are secondary.—A. R.]

Semmola returns to this subject in a recent paper⁵⁸⁹ confirming, with a new series of experiments, his former opinion that the fundamental pathological condition necessary for the passage of albumin through the kidneys—and hence for the production of Bright's albuminuria—is the morbid diffusibility of the sero-albumin, which is a true dyscrasia in Bright's disease and a primary etiological condition. He is convinced that in the majority of cases—acute infectious diseases; toxic, rheumatic, and gouty dyscrasias—the albuminuria always arises from modification in the diffusibility of sero-albumin, resulting from molecular alterations in the blood. When in these cases a nephritis exists, it is the result of the same diathetic condition or due to the effect of the albuminuria on the kidneys. As is well known, he bases this opinion on the results of experimental injection of egg-albumen, which, he holds, produces not only albuminuria, but other phenomena seen in Bright's disease,—*e.g.*, albuminuric retinitis; and he claims that these results are all due to the circulation in the blood of a so-called toxalbumin.

Freund,⁵⁷ ¹⁵ after pointing out that Semmola's statements have been contradicted by several observers, details his own results on the blood of patients suffering from chronic parenchymatous nephritis. In these cases the proportion of globulin to albumin in the blood-serum was as 1 to 2 or even as 1 to 3. He does

not regard this as characteristic of Bright's disease, as he found a somewhat similar proportion of these two substances in a case of pernicious anæmia. He has also found that the coagulation-temperature, both of the blood-serum and of the serous exudations in Bright's disease, was higher than that of normal serum. Some experiments on the diffusibility of the serum in seventeen cases of Bright's disease show that, although the blood-serum has undergone changes, these scarcely afford sufficient evidence to establish the view that it is primarily a blood disease.

Marion³⁶⁰_{Mar., '95} insists on the fact that in renal affections the noxious matters passed in the urine are not so important as those which are retained in the organism; and in support of his views he cites five cases, three of which had no albumin in the urine, though the kidneys were working very badly and the patients were in a grave condition. As to the others, one passed eighteen grains and the other forty-eight grains daily of albumin, yet both patients only presented a few slight symptoms of Bright's disease.

Speaking of blood-alterations in renal diseases, Bogdanoff-Beresowsky³¹_{June 8, '95} states that nephritis gives rise to altered hæmatopoiesis, while the blood tends to maintain the normal standard of its figured elements, whence the persistence of the adult and ripe forms. In acute nephritis with favorable issue the blood grows young again, becomes richer in young elements, and returns little by little to its normal condition. In chronic nephritis the alteration of the blood is more profound; improvement is transient and inconstant, according to the degree of modification caused by the primary disease.

Legendre¹¹⁸_{v.13, No.3; Aug., '95}⁵¹ separates albuminuria, due to various causes, from true nephritis. In the newly born albuminuria is often due to difficult labor, to beginning asphyxia, or to sudden changes in the circulation at the moment of birth. This condition is temporary and requires no special treatment. In older children albuminuria without nephritis is present in certain pathological conditions, such as eczema, impetigo, angina, stomatitis, etc. The most frequent cause is digestive disturbance with auto-intoxication and insufficient hepatic activity. Alimentary hygiene and intestinal asepsis are the cures for this kind of albuminuria. The albuminurias of adolescence require further investigation. Treatment consists in diet, fresh air, friction, salt- or sulphur-baths, and, as drugs, phosphates and strychnine. In albuminuria due to nephritis the real lesion is due to the action of toxins upon the kidney, and the kidney symptoms following the administration of Roux's serum can be explained in the same way. As to treatment, milk diet, purgatives, intestinal antiseptics, frequently-

repeated cold sponging, and frictions generally suffice to prevent accidents. The only useful drug is caffeine, and in uræmia nothing is efficacious except bleeding.

Ott ⁵_{May, '95} has no doubt of the occurrence of an alimentary albuminuria dependent upon the ingestion of proteids in excess, particularly when uncooked. This opinion is based upon the results in fourteen cases experimented upon, in all of which traces of albumin were found in the urine in from four to six hours after the ingestion of uncooked egg-albumen. The condition is, however, but transitory, and would appear to be of no importance in the production of disease of the kidney, and to have no diagnostic significance as regards nephritis.

Under the heading "intermittent albuminuria," Ott includes those cases which have been designated as "cyclical" by Pavy, "functional" by Raabe, and "transitory" by Kinnicutt. This condition is believed always to depend upon inflammatory changes in the kidney, often very slight in extent. The quantity of albumin in the urine is extremely variable and would seem to be governed by no rule. It is not dependent on the character of the food, as is the alimentary albuminuria, and is increased with great regularity by exercise, often almost entirely disappearing as the result of rest in bed. Usually casts and renal epithelium are present in the urine at some time in the course of the disease, though they may appear and disappear most irregularly.

Osswald, ¹¹⁴_{v. 26, p. 1, '94}, ¹¹²_{Feb., '95} after careful observation of a number of cases of what Pavy terms "cyclical albuminuria," comes to the following conclusions: 1. Most of the patients come to the physician complaining of symptoms common in true nephritis, or are met with in examinations for insurance, when a diagnosis is not likely to be made. 2. The symptoms as well as the anæmia disappear with the albuminuria and recur with its re-appearance. 3. In many of the cases there has been a previous acute nephritis following scarlet fever or diphtheria, and in some cases the acute nephritis is directly followed by cyclical albuminuria. 4. The absence of organic elements, especially of casts, is not against a nephritis. Indeed, in some cases, especially in later observations, true casts have been found. 5. Periodical albuminuria is often found in cases of true nephritis. 6. Organic changes of the heart and other organs are not present. Osswald therefore believes that intermittent albuminuria—that is, a temporary excretion of albumin without accompanying organic change—may, after years, entirely disappear, and cannot be viewed as a true nephritis in the ordinary sense. He thinks they are often cases where there has been a previous nephritis and a few glomeruli are still diseased.

These, under certain conditions of work, etc., cause albumin to appear in the urine.

A case of this kind has been investigated by Tewes⁴_{No. 17, '94} and⁵_{Mar., '95} with particular reference to the effect of muscular activity, the patient being an apparently healthy boy of 10 years. As long as he lay quietly in bed albumin was absent from the urine, but, even though he remained in bed and in the horizontal position, muscular exertion always caused its appearance. Similarly, when up and about as usual, added muscular exercise in the shape of gymnastics always materially increased the amount of albumin present. On the other hand, the quantity of albumin excreted bore no relation to the quantity of nitrogenous food taken. The albumin found in the urine was determined by analysis to be always serum-albumin.

Richter⁴¹¹_{May 24, '95} remarks that albumin may be found in the urine of healthy young subjects, particularly in the morning, and that transitory albuminuria may arise from functional disturbance without involvement of the renal tissue. The quantity of albumin in no way furnishes a guide as to the gravity of the case.

Landon Carter Gray,⁵_{Oct., '94} from examinations of the urine in cases of neurasthenia and other functional nervous diseases, has found that many of these cases, and especially those of neurasthenia, may constantly, or well-nigh constantly, be accompanied by albuminuria, glycosuria, excess of uric acid and oxalate of lime, and occasionally by excess of urea, indican, and hyaline casts; that these urinary products are probably results, rather than causes, of disease, and represent what has been called lithæmia, and not cases of early nephritis. The author adds that it is possible that there are different albumins in the urine, and that upon the determination of these will rest the future diagnosis of nephritis from other diseases.

C. E. Simon,¹_{Sept. 14, '95} after reviewing the opinion expressed on that form of albuminuria which is not connected with organic changes in the kidney-structure, and which must, therefore, be considered as a manifestation of a purely functional anomaly on the part of the economy, gives a clinical summary of cases of this kind observed by him, in which nervous symptoms were constantly met with of a type seen in what may be termed the hypochondriacal form of neurasthenia. The patients showed also dyspeptic symptoms, which were likewise nervous in character. The heart was perfectly normal and no evidence of increased arterial tension was met with. In short, beyond the existence of albumin in the urine there was not a single symptom pointing toward the existence of organic renal disease. The urine had a high specific gravity, which is to be attributed to the increased elimination of

urea and other nitrogenous constituents. In the pure cases of what the author terms "lithuric albuminuria" the uric acid is constantly and very decidedly increased, while this is less marked in the oxaluric form, where the oxalic acid is also increased. The knowledge of this particular form of albuminuria is as yet too limited to warrant the drawing of any definite conclusions as to its ultimate origin. It will hence be well to regard it as referable to a general metabolic insufficiency on the part of the economy, characterized by an increased nitrogenous waste on the one hand and insufficient combustion on the other, resulting in an excessive formation of uric, and at times of oxalic, acid.

From examination of the urine in a large number of cases Spiegler⁶⁵⁰ ⁵_{No.38,'94; June,'95} arrives at the conclusion that albumin is a very frequent, but not a normal, constituent of the urine, due to certain irritations. Anything which affects the mental or physical equilibrium may lead to the excretion of traces of albumin; for example, bodily exertion, strong emotions, even moderate consumption of alcohol.

Macfarlane⁵⁹ ^{Dec.22,'94 has detected albumin and casts in the urine of foot-ball players, and he explains these cases and the many others in which albumin does at times appear in the urine as a result of excessive physical exertion, by the acute mechanical congestion associated with the game, and he warns against the dangers of such a violent strain frequently repeated.}

From the examination of the urine of patients seeking advice for various ailments, Shattuck¹⁰⁸³ ^{Sept., '96 has come to the following conclusions: (1) renal albuminuria, as proved by the presence of both albumin and casts, is much more common in adults, quite apart from Bright's disease or any obvious source of renal irritation, than is generally supposed; (2) the frequency increases speedily and progressively with increasing age; (3) this increase with age suggests the explanation that the albuminuria is often an indication of senile change; (4) though it cannot as yet be regarded as absolutely proved, it is highly probable that faint traces of albumin and hyaline and finely-granular casts of small diameter are often, especially after the fiftieth year of age, of little or no practical importance.}

Colrat²¹¹ ^{Oct.14,'94 describes the case of a young man who, after a grave form of scarlatinal nephritis, constantly showed albumin in the urine. This albuminuria, which was accompanied by no disturbance of the general health, was evidently influenced by the diet, there being a marked diminution under milk diet and an increase when more abundant nourishment was given.}

Deaver and Frese, of Philadelphia, have maintained that ether

exercises an unfavorable action on the kidneys, but Barenfeld's researches ¹_{Jan. 5, '95} (as shown in section D, vol. v) demonstrate that this opinion is not well founded.

Seelig ²⁷³_{B. 22, H. 1, 2;} ⁵_{May, '95} has recently examined the mode of production of albuminuria after compression of the thorax. He had formerly supposed that albuminuria was due, in the condition mentioned, to lowering of the blood-pressure, which could be demonstrated in the carotids. This view seemed to be supported by the fact that here, as in ligation of the renal artery, the excretion of albumin took place in the glomeruli. The author's investigations, however, reveal an essential difference in the microscopical appearance of the kidneys in the two conditions. After temporary ligation of the artery there is hyperæmia of the cortex, with excretion of coarse, albuminous masses stained with blood-coloring matter. After compression of the thorax there is anæmia of the cortex, with fine and colorless, albuminous granules. From this result Seelig believes that the disturbances of the kidneys from compression of the thorax are so slight as to be probably within physiological limits. Further experiments showed that sulphindigotate of sodium was excreted as rapidly as in the normal state during the existence of albuminuria from compression, but that arterial ligation lasting only fifteen minutes caused slow and imperfect excretion of the indigo salt, lasting for a day. Compression of the thorax is the only method by which experimental albuminuria can be produced without extensive disturbances of the renal circulation.

Bright's Disease.

Etiology.—An editorial article ⁹⁹_{Jan. 10, '95} deals with the primarily infectious nature of Bright's disease. Among the acquisitions to medical knowledge during the last fifteen years may be noted the demonstration of the unity of Bright's disease, the several varieties commonly admitted, in the interest of precision, being only modalities of one pathological process affecting both the connective-tissue stroma and the secretory substance,—sometimes one, sometimes the other predominantly,—but always with marked tendency to produce the fibroid, contracted kidney as the ultimate phase. The predominating rôle of infectious agents in the etiology of the disease, especially of the acute form, has been particularly demonstrated within the past few years, all being agreed as to the secondary infection of the kidney. The microbes of many infectious maladies (scarlatina, pneumonia, typhoid fever, etc.) have been detected in properly-stained sections of the inflamed kidney, complicating or following these diseases, and an intense renal

inflammation has been produced by inoculating dogs and puppies with the streptococci found in experimentally induced bacterial endocarditis. That there is a primary acute bacillary nephritis is also in accordance with the researches of Letzerich; but to Bamberger belongs the credit of first calling attention to this primarily infectious form, which has since been studied by Aufrecht, Litten, Babès and Perret, and lastly by Fiessinger. The patients are stricken while in apparent health and present from the onset symptoms of gastro-intestinal disorder, with fever, which is sometimes intense. The liver and spleen are enlarged; the principal nervous symptoms are headache, restlessness, delirium, modification of the pupils, prostration. The skin may become the seat of various exanthemata, and ecchymoses and hæmorrhages are often present. The urine is scanty and loaded with albumin. The infiltration of the integument is constant; the anasarca is generally, though far from invariably, limited to the lower extremities. The cases recorded by Babès and Perret, like those of Litten and Fiessinger, were not very grave ones, those which proved fatal terminating in four to six days of "convulsive or comatose uræmia." Fiessinger further relates a number of cases which, he thinks, point to contagious transmission.

By injecting into the blood of rabbits different poisons, especially sulphuric acid and neutral ammoniacal salts, Burmeister²⁰ succeeded in producing forms of nephritis marked by epithelial lesions, hyaline casts, infiltration of small cells, etc. A comparison of experimental with clinical facts led him to conclude that the process is the same everywhere; the elements undergoing an alteration are, first, the epithelia of the tubules and afterward the epithelial cells of the straight tubules, the glomeruli, and the interstitial connective tissue with the vascular walls.

As the result of an experimental investigation of the subject, Vandervelde⁸⁶⁸ arrives at the following conclusions: Whenever a toxic substance reaches the kidney by way of its nutritive artery it exerts an elective action upon the epithelial cells of the convoluted tubules. This law holds good for the mineral poisons, the microbian poisons, and those elaborated by the system itself. The action of the toxic product upon the cell gives rise to lesions of the protoplasm,—turbid swelling, steatosis, and coagulation-necrosis. The rapidity of evolution of the lesions varies according to the poison producing them, nuclear alterations occurring later than those of the protoplasm. While the lesions of connective interstitial tissue and vessels are not constant in the infectious kidney, the alterations of the striated epithelium are always found with the same features, determined by a toxic agent and similar to those

caused by mineral poisons and by the products of imperfect combustion of albuminoid substances.

A. Favre ²⁰_{Jan. 4, '96} describes four clinical cases seemingly showing that parenchymatous nephritis may be the result of retention of urine and infection of the blood by bacteria, which are in themselves capable of producing nephritis. By injection into rabbits of cultures of the blood of an eclamptic patient, whose stomach showed round ulcers, the author was able to produce a ptomainæmia and round ulcers. Such facts indicate that the bacteria of the placenta are circulating in the blood and act as a pathogenic factor in the kidney of pregnancy and eclampsia. To the same bacteria are to be attributed the ptomainæmia and the round ulcers.

Sacaze ⁹²_{Feb., '96} ⁵_{June} calls attention to the fact that, though we recognize the occurrence of nephritis in the course of the more severe infectious diseases, we are apt to overlook the possibility of it being also produced by slight affections, in themselves of little importance. He records the case of a gardener, 65 years of age, who, in handling some wood, scratched his hand slightly; he neglected the wounds, and three days later, after local redness, was seized by symptoms of general infection and nephritis, from which he died one month later. The diagnosis was confirmed by autopsy. Cultures from the skin wounds during life showed the staphylococcus albus. The author concludes that the nephritis was due to infection from the skin wounds, and that the staphylococci may thus cause an acute nephritis, finding entrance through a slight skin wound.

Holst, ¹⁰⁸⁶_{Feb., '96} ⁷⁷_{Aug.} as a result of his own investigations, is inclined to support the view that the microbes, by means of their toxins, are able to produce diseases of the kidneys without being present in the kidneys *per se*, and that this action of the toxins seems to appear late, thus causing chronic kidney disease after the primary infection has disappeared.

Reichs ³¹⁹_{No. 2, '96} ⁵_{Apr.} reports some cases in which necrosis of the renal tubules seemed to be due to repeated convulsive attacks, and attributes the degeneration to intoxication by the products of muscle-fatigue. The author holds that delirium tremens and other forms of delirium with restlessness and motor excitation are possible causes of this form of renal degeneration. If this be so, the beneficial effect of hypnotics in delirium tremens and of narcotics and sedatives in uræmic and other convulsions becomes clear, since by their help the organism is spared a dangerous complication.

Max Baatz, ³¹⁹_{Sept. 5, '94} ²_{Oct. 6} after referring to the experimental and clinical evidence concerning naphthol nephritis, already recorded,

relates the cases of two brothers, aged respectively 6 and 8 years, who were treated for scabies with a 2-per-cent. β -naphthol ointment. About three weeks after the sixth inunction a lethal nephritis developed, confirmed by necroscopical examination. The β -naphthol was undoubtedly the cause of the nephritis. The author warns against the use of β -naphthol,—at least, in cases where other remedies are available.

[Speaking of Bright's disease and alimentary toxæmia, Dieulafoy, in a clinical lecture, describes a case showing the dangers of alimentary intoxication in patients affected with Bright's disease. A man, 58 years old, strong and vigorous, three years before had begun to suffer from palpitations, dyspnœa, headaches, and some œdema, which symptoms and analysis of the urine led to a diagnosis of Bright's disease. The physician prescribed a milk diet, warning the patient as to the dangers which might follow any dietetic error. During a period of some months the patient strictly followed these directions, but on one occasion ate some lobster and fish, which appeared to him to be spoiled. He was seized with fever, anorexia, anuria, and an urticarial eruption over the whole body. In spite of energetic treatment his condition grew rapidly worse and he died comatose thirty-six hours after the beginning of the symptoms. Such cases show how in Bright's disease, where life is possible with a regular dietetic system, the absorption of alimentary ptomaines, which the kidneys are unable to eliminate, may give rise to lethal poisoning.—A. R.]

By inoculating guinea-pigs with antidiphtherin Senator ³¹ June 1, '96 has succeeded in producing certain renal alterations which seem to him to support the views of Virchow as to the existence of an acute parenchymatous nephritis. Several of the animals had already succumbed thirty hours after the inoculation, and showed, therefore, recent lesions of the kidneys. There were to be seen only alterations of the epithelia in the shape of foci. The epithelial cells were detached and partly obstructed Henle's loops; there were, moreover, regressive alterations of the nuclei (caryolysis). No lesion of the glomeruli was discoverable; outside of an enormous capillary hyperæmia there was no interstitial lesion at all. The lesions, therefore, belonged to the type of an acute parenchymatous nephritis.

According to Aufrecht, ³¹⁹ May 4, '96 acute parenchymatous nephritis, chronic parenchymatous nephritis, and contracted white kidney belong to the class of tubal nephritis which, becoming chronic, involve the afferent vessels; glomerular alterations depend on these latter. On the contrary, the nephritis hitherto called chronic and ending in contracted red kidney is from the onset a vascular

nephritis. In the slightly-advanced stages of this tubal nephritis chronic hæmorrhagic nephritis sets in; in the advanced stage of the vascular form a tubal nephritis is always superadded to the contracted red kidney.

Perry and Shaw¹⁵_{Dec., '94} state that, of seventy cases in which ulceration was found in the duodenum, in twelve there was either interstitial or tubal nephritis, or both combined. This implies a causal relationship between the two conditions. In one patient ulcerated areas, such as are common in Bright's disease, were found scattered throughout the large and small intestines, and the lower half of the duodenum was similarly affected. This case showed that the ulcerative enterocolitis of Bright's disease may extend as high as the duodenum. In all the other cases there was a marked absence of enteritis in the lower part of the intestine and the conditions found in the duodenum did not materially differ from those found where there was no Bright's disease.

A paper by Famechon²⁴³_{Jan., '95} enters into the question of the frequency of nephritis in the French army. Taking the records from 1878 to 1891, it would seem that the deaths from that cause in 1890 and 1891 were considerably greater in number than in preceding years, partly, perhaps, in consequence of an alteration in the law of enlistment, but no doubt also from the presence of influenza. It is interesting to note that while the acute disease is far more common in France than in Algeria or Tunis, showing thereby the etiological influence of cold, the reverse is the case in regard to the chronic form, pointing to the effect of malaria in the production of Bright's disease. The influence of cold is shown by the monthly curve of nephritis, which corresponds pretty closely with that of the diseases of the cold season, more especially with that of throat affections (anginas), which it follows with about a month's interval. Of the 10 cases during seventeen months in Famechon's regiment, having a mean strength of 967 men, it is interesting to note that 6 occurred between May 20th and May 30th, after exposure to chill during marches.

J. Ellis Rodley¹⁴⁷_{Dec., '94} calls attention to the clinical features of that form of Bright's disease designated by the several synonyms chronic interstitial nephritis, cirrhotic kidney, granular contracted kidney, and gouty kidney,—names which have reference to the anatomical changes to be observed after death and to the frequent association with a special diathesis or constitutional state. Of all the varieties of Bright's disease this is the most gradual in its developments, the most prolonged in duration, and yet the most intractable and fatal. Persons suffering from this form of disease are treated for one of the complications which appear during its

progress, and which often excite no suspicion of the real nature of the complaint. In other cases the patients have never sought medical advice, supposing themselves to be in good health, until some urgent or distressing symptom causes them to seek relief. The most constant feature in the subjects of contracted kidney is the absence of visible dropsy in the earlier stages, and from this fact the disease fails to secure recognition. The author is inclined to believe that among the many causes to account for the production of the disease none is more frequent than long, persistent dyspepsia, which gives rise to circulatory disturbances and irritation of the cellular elements of the kidney; that is, to the first step toward slow chronic inflammation, involving the connective tissue and causing desquamation of the epithelium of the uriniferous tubules. If the urine be examined at this time it may be free from albumin, but the microscope will reveal epithelium from the tubules of the kidney. If the irritation be continued from this or any other cause, as, for example, the administration of cantharides, turpentine, copaiba balsam, etc., the delicate basement-membrane of the tubules, being denuded of its epithelium, is thus directly exposed to the action of the irritating agent; the supply of blood is increased in the adjacent blood-vessels, transudation takes place into the uriniferous tubules, and we find uriniferous casts and epithelium in the urine. Increased blood-supply and escape of new germinating tissue stimulates it to activity, and so we have proliferation of its cellular elements and growth of the tissue itself. This new tissue undergoes contraction and obliterates the Malpighian tufts and tubules of the kidney. The lesson to be learned from this theory of the disease and the operation of its causes is that attention should be given to all cases of persistent dyspepsia, bearing in mind not only the effect upon the stomach and intestine, but the remote and lasting derangement of the kidneys, upon the action of which so much depends. The frequent use of the microscope in all cases of aggravated dyspepsia furnishes a safeguard against error and an early warning of the beginning of mischief.

Diagnosis.—Von Ziemssen ³⁴_{July 9, '96} calls attention to two symptoms which have a very important bearing on the diagnosis, prognosis, and treatment in chronic nephritis. These symptoms are a change in the percentage of hæmoglobin in the blood and a change in the blood-pressure. In typical cases it is easy to differentiate between parenchymatous and interstitial nephritis, but there are cases in which one form changes gradually into the other (diffused nephritis); they may set in together and have a chronic character, existing for many years without apparent injury to the patient.

In such cases the symptoms referred to are of great importance. In parenchymatous nephritis a decrease of hæmoglobin in the blood is always observed, proportionate to the severity of the disease; but in the interstitial the reverse holds good,—particularly in the beginning,—the amount of hæmoglobin increasing and the increase continuing, it may be, for years. The blood-pressure in the parenchymatous form at first falls, although it rises at a later period, but never to the height which is reached in contracted kidney. Here the blood-pressure rises at the onset, and, later on, when the disease has existed for years, the pressure may reach 200–220 mm. Hg., this being the maximum limit for the human being,—i.e., twice the normal.

[According to the experimental researches of von Fodor,³¹⁹ Sept. 7, '95 the appearance of great quantities of uric acid in the blood of nephritic patients cannot be regarded as constant, as the observations of Jacobi might lead one to think. The kidneys are to be regarded as only one of the seats of formation of uric acid.—A. R.]

Van Fleet,⁵⁹ June 29, '95, who has especially studied the significance of the eye symptoms in Bright's disease, says that the worst condition is retinitis albuminurica, because, while optic neuritis may subside without having any atrophy, retinitis albuminurica seldom disappears without leaving its marks. The condition most often found in the eye in Bright's disease is engorgement of the retina with blood, more or less swelling of the nerve, white patches sprinkled over the fundus on a red background. When such a condition is seen the observer should think of the kidneys at once, for it usually indicates the terminal stage of Bright's disease. In chronic nephritis retinitis apoplectica is a fatal symptom, being of much graver significance than when caused by rheumatism or gout, for these affections do not necessarily imply disease of any particular vital organ, and the skin, bowels, etc., would probably rid the system of the effete material; but when the cause is a structural change in the kidneys, the outcome can be predicted with certainty. Vicarious elimination would not subserve the same purpose for any considerable length of time. Another symptom in Bright's disease is amaurosis nephritica or sudden blindness. This may occur without any apparent change in the eye, but simply as the result of the action of urea on the visual centres. It occurs most often in acute disease, and may end in complete recovery.

Max Rothmann⁴ No. 30, '94, formulates the following conclusions on uræmic blindness: 1. The blindness appearing after severe nephritis, with or without any other uræmic symptom, is of peripheral nature and dependent on an œdema of the optic sheath. The same

holds good for the amaurosis due to hæmorrhages. 2. Reaction of the pupils may be preserved, enfeebled, or lost; if preserved the prognosis is good. 3. If the pressure of the exudate be very strong, permanent blindness may follow from degeneration of the optic-nerve fibres. 4. In transitory blindness the optic nerve, after vision has returned, is completely normal or only degenerated in the cortical portions.

S. West ²_{Feb. 2, '96} read to the Clinical Society of London notes of two cases in which the following points were worthy of attention: 1. The occurrence of marked ocular symptoms in granular kidney, showing, first, that the disease had existed for some time, and that it was in an advanced stage, and, secondly, that it had reached its termination. 2. The suddenness of the onset of ocular symptoms in granular kidney, which was most strikingly seen in failure of vision, so that a patient might become blind in but a few days and continue so after the first defects of vision had been noticed. 3. The hæmorrhagic tendency, illustrated in one of the cases by purpura and retro-orbital hæmorrhage. 4. Detachment of the retina,—a very rare occurrence in granular kidney.

De Dominicis ³¹⁹_{May 4, '96} has endeavored by experiments to throw some light on the pathogenesis of cardiac hypertrophy in disease of the kidneys, and from experimental and clinical evidence is led to conclude, first, that idiopathic hypertrophy of the heart occurs often enough without any kidney-lesion; and, secondly, that serious and extensive changes may be induced experimentally in the kidneys without any functional disturbance of the heart and without even giving rise to the general condition of Bright's disease. When cardiac hypertrophy and renal disease exist together, they must be regarded as common effects of a chemical poisoning of the blood.

Ludwig Bremer, ⁹_{Oct. 20, '94} in his neurological and psychiatric practice, has for years met with cases presenting localized or general nervous and mental troubles, whose origin and nature seemed to be obscure, and whose connection with renal lesions became apparent on examination of the urine, although the albuminuria, generally considered as essential, was sometimes absent. Among the symptoms, mental aberration, illusions, hallucinations, general confusion, impairment of memory, aphasia, muscular spasticity, neuralgias, paralysis, etc., are the most common. For some cases they are but rudimentary.

Le Roy ¹⁵²_{Nov. 23, '94} observed a case of nephritis after mumps, which, running a somewhat protracted course, ended in death four months after the onset.

A. Gray ⁵⁰⁶_{Dec., '94} describes two cases of a somewhat peculiar form

of Bright's disease, which the post-mortem examination showed to be connected with a parenchymatous degeneration of the kidneys. The etiology in both cases was chronic malarial infection. The symptoms were: extreme paleness, indigestion, general malaise, headache; general flabby condition of the skin; urine about normal in quantity, with a high specific gravity in one and a low one in the other. In the former improvement slowly followed and the patient finally recovered; in the case marked by low specific gravity of urine improvement took place for the first two months, then came a stage of stand-still, and afterward the patient grew worse and died in a perfectly developed uræmic convulsion.

A case of malarial nephritis is described by Bermann.⁵⁹
Dec. 23, '94
The patient, a forester 17 years old, was brought to hospital with advanced œdema of legs and abdomen. Owing to want of intelligence, he could give no exact particulars of his preceding history. The chemical and microscopical examination of the urine showed a great amount of albumin, hyaline and granular casts, epithelial cells, blood-corpuscles, etc. The ordinary treatment of nephritis gave no positive results. During his stay in the hospital a characteristic access of ague was observed, which recurred the next day. Quinine in large doses was administered and the attacks ceased. In the course of the fever-free days an abundant diuresis set in, with corresponding diminution of œdema. Five days after the last access only traces of the œdema and ascites were recognizable and the amount of albumin in the urine was reduced to minimal traces. The patient felt so well as to leave the hospital greatly improved. From the fact that no result followed the usual treatment of nephritis, while quinine, cutting short the access of malarial fever, exerted a beneficial influence on the symptoms of that disease, the author argues that in this case it was probably due to the malarial infection.

Waldo⁶⁹⁷
Apr. '95 relates a case of acute nephritis with uræmia, attended by an erythematous rash and extensive desquamation. The nephritis resulted from cold. The patient fully recovered. This case is very interesting on account of the rarity of a skin rash in association with uræmia. There was no evidence or suspicion of scarlet fever.

Etienne¹⁴
July 14, '95 describes the following case: A woman, 42 years of age, had an ulcer in October, 1892. In April, 1893, she was suffering from albuminuria and œdema. On May 10th symptoms of uræmia and cerebral arteritis set in, and on May 27th the patient died. On post-mortem examination renal lesions were found, consisting of a degeneration of the epithelium of the convoluted tubules and a slight degree of arteritis.

Thirollox⁴³³_{July 13, '95} describes a case of nephritis developed suddenly, without any of the usual causes, during the secondary period of a syphilitic infection. Despite the most energetic treatment the patient succumbed, after two months, to an attack of dyspnoëic and then comatose uræmia. Microscopical examination of the kidneys showed the lesions of an old nephritis from arterial aplasia, to which were added the epithelial lesions dependent upon the localization of the syphilitic virus in the kidneys. A somewhat similar case is recorded by L. Levi³⁶⁰_{Aug., '95}; it was, however, characterized by the fact that the syphilitic infection was hereditary.

Howard Fussell¹¹²_{June, '95} describes eight cases of nephritis in which the patients did not complain of their serious condition, or in which the symptoms would not have suggested examination of the urine. The disease was discovered because the urine of all patients applying to the author's department of the hospital is examined, whatever the nature of their complaint. All the urine examined was treated by the centrifugal machine, which gives results far more satisfactory than the usual method of allowing the urine to stand twelve to twenty-four hours.

J. Bergen Ogden⁹⁹_{Sept. 27, '94} describes three cases of chronic Bright's disease of different types, illustrating the value, from a diagnostic point of view, of the daily measurement of the quantity of urine. The pure interstitial type of nephritis showed a marked increase up to, on the average, 100 ounces (3100 grammes), more or less; the chronic diffuse was smaller in quantity, but yet above the normal, the average running up to 80, 90, or 100 ounces (2500, 2800, or 3100 grammes); the chronic parenchymatous or subacute nephritis had an average quantity of urine far below the normal, with a relative increase, but an absolute diminution, of solids. These cases also showed the difference in the proportion of albumin to that of the quantity of urine, a large amount of this being accompanied with a proportionately small quantity of albumin.

Nephritis in Children.—Cases of primary acute nephritis in children are described by Lueck,⁸⁰_{Nov. 15, '94} Carpenter,⁵¹_{Mar., '95} Root,⁶¹_{Apr. 20, '95} and Brigham.⁸¹_{Sept., '95} One of the more interesting cases is that of Root, whose patient was an infant in whom the symptoms of nephritis set in, soon after birth, with difficult and painful urination, fever, and eclamptic convulsions. At the necropsy the kidneys were found to be swollen and full of blood, presenting the appearance of acute inflammation, which was confirmed by microscopical examination. In children Lueck⁸⁰_{Nov. 15, '94} recommends pilocarpine, which he employed with most satisfactory results. The author considers this drug as the sheet-anchor in renal dropsy, especially in children.

L. Bard ²¹¹_{v.2,p.355,'94} maintains that, besides the anatomical and functional recovery of the kidney after acute Bright's disease, a third form of recovery exists, which he terms "cicatricial" and which, if not a *restitutio ad integrum* is, nevertheless a cure from the clinical point of view, though albuminuria may persist. This albuminuria is the result of an imperfect regeneration of the altered renal elements, which condition, however, will not lead to any other symptom. The urine requires to be watched, but no special treatment is called for.

Treatment.—After reviewing the opinions expressed on the etiology of Bright's disease, McLachlan ²¹³_{Oct., '94} deals with the treatment of this affection. Of course, the starting-point must be to remove or counteract, if possible, all conditions acting as cause. The diseased organs must be rested for prolonged periods if active inflammatory processes be present. This object is best accomplished by confining the patient to a rigid milk diet for months, and, if need be, for years. The skin should be kept in a highly-efficient state by warm clothing, whether in bed or out of bed, by hot or vapor baths, used according to the needs of each special case. Constipation should be overcome by the least harmful of aperients. Should dyspeptic symptoms persist despite these measures, then artificial aids may be employed. In mild cases of acute nephritis the patient need not be rigidly confined to milk, but simple farinaceous food may be allowed in limited quantities. In severe cases, however, a rigid milk diet is indispensable; and even in comparatively mild cases, if the albumin does not speedily diminish, it is absolutely necessary. In acute and chronic tubal nephritis the tubes become blocked by tube-casts and desquamated epithelial cells. Hence the necessity for promoting and keeping up diuresis for prolonged periods. Advantage may here be taken of alkaline diuretics, given in considerable doses thrice daily. If the diuretic flow is not sufficiently abundant, other measures, in conjunction with the above, may be used,—viz., digitalis, broom, squills, etc. Habitual purgation is to be avoided, as it weakens the patient and withdraws a certain amount of fluid needed to maintain urinary flow. Purgation also removes the digestive juices and ferments, which are much needed in such cases. When dropsy is very severe, the lungs œdematous, and the breathing difficult, it is customary to have recourse to violent purgation; but the author thinks it is much better practice to endeavor to get rid of the dangerous accumulations by the natural channels,—viz., the skin and kidneys. Sir James Simpson's "poor man's bath" is of great service in such an emergency, along with a diaphoretic and diuretic mixture. If need be, the patient may be enveloped in

blankets wrung out of boiling water. If uræmic convulsions set in, there is nothing that controls them so well as the application of half a dozen leeches to the loins. In some cases stimulants may be required to prevent the patient dying from heart-failure; at all other times they should be rigidly avoided. When convalescence has well set in some extension of the dietary may be allowed, and may indeed be advisable, provided dyspeptic conditions can be kept away. Tonics are now of paramount importance. When convalescence seems protracted a sea-voyage or a residence in the tropics may be the one thing needful. In cirrhotic kidney the difficulties of treatment reach the culminating point. The etiology is obscure and perplexing; hence the treatment is vague and uncertain. Iodide of potassium seems to be the only drug that has effected much good. On the other hand, a change of climate can work nothing short of a cure in some cases, when the disease is not too far advanced.

The following are the rules adopted by Sapelier⁶⁷ in the treatment of Bright's disease. Each time that an acute or sub-acute attack is noticed the patient must be enjoined to make a more or less long sojourn in bed. The author recommends very strongly that no sheets be used, the patient to lie between blankets used as sheets, and, when he gets up, to wear flannel next the skin. A prolonged stay in a warm climate, provided that the place selected be not on or near the sea, is always to be recommended. Besides, the patient should be briskly rubbed with a flesh-brush every morning, but no baths should be allowed for fear of his taking cold. Moderate exercise is necessary, but, if not feasible, massage should take its place. Marriage or pregnancy should be forbidden to women, and the greatest sobriety should be enjoined on men as regards sexual relations. Milk is the food and medicine *par excellence*. It may be taken in any shape, but two quarts (litres) need not be exceeded in the day; the friends and attendants should be made to understand that milk is the *sine quâ non* of the treatment. When a real improvement has taken place a vegetarian diet may be allowed, consisting of farinaceous substances, vegetables, yolk of eggs, cooked fruits, etc. Meat may be given later on, and should consist of chicken or fresh pork, while beef, mutton, game, fish, and cheese should be rigorously proscribed, and also alcohol. As to the medical treatment, besides the milk, the author counsels only purgatives and diuretics. When the heart shows signs of failing he injects a solution of caffeine.

Repenak²¹ ¹⁰⁰¹ does not believe in the usefulness of the usual diuretic remedies in the treatment of Bright's disease, and, while

admitting that calomel has an action in this direction, he warns against the danger of stomatitis, not always avoidable. No reliance can be placed on astringents, fuchsin, etc. The best therapeutic measure is, for him, the use of hot baths coupled with a milk diet.

Hale White ^{824 59}_{Apr., '96; May} has convinced himself that none of the reasons urged in favor of a milk diet are valid. He has watched his patients closely and has noticed that they always felt better on an ordinary diet than on one of milk, which leads to weakness and diminution of weight and causes digestive troubles that prevent all further treatment. On the contrary, in cases of chronic Bright's disease with a feeble circulation, ordinary diet containing meat is an excellent thing, and the good that is done is due largely to the cardiac stimulant action of the extractives in the meat. For the same reason this is just the class of cases in which a little alcohol is beneficial, for it not only aids the circulation, but improves the digestion. Of course, a diet composed largely of meat should be given with caution to patients in whom the pulse-tension is high and the hypertrophied heart is acting powerfully. But we ought not, unless the pulse-tension is very high, to fly at once to the other extreme and give nothing but milk, for it must be remembered that the high-tension pulse is in itself, probably, evidence of a uræmic condition, which is rather accelerated by milk. For the most of such patients it will suffice to order small meals—one or two more in the day than usual—and to avoid alcohol altogether. An ordinary diet should be avoided in acute Bright's disease, and a milk or farinaceous diet substituted.

Hirschfeld ^{748 15}_{May, '96; Sept.} considers that the albuminuria is the first point that calls for attention, and that all articles of diet which cause an unequivocal increase in the daily loss of albumin are to be avoided,—for instance, alcohol and smoked meats. Eggs are not harmful in moderation. He points out that, although the actual loss of albumin in the urine may not amount to more than a few grammes per diem, yet this loss cannot be made up for by increasing the amount of proteid in the food. Not only is an increase of proteid in the food followed by an increase in the albuminuria, but, in addition, there are increased amounts of nitrogenous extractives to be excreted, and thus more strain is thrown on the damaged kidneys. Although, of course, the increased loss of albumin is much less than the increase of proteid in the food, yet it is extremely doubtful whether any proteid is retained in the body as such. In health it is known that increased proteid food leads to increased proteid metabolism, and that, if proteid metabolism is to be checked, it is done most efficiently by

increasing the fatty and carbohydrate foods. For these reasons the albuminuria is not to be combated by increased proteid diet. Hirschfeld states that a rich proteid diet is likely to lead to retention of nitrogenous extractives, since the increased excretion of these extractives following such a diet occurs later in patients with diseased kidneys than under normal conditions. He would give about 6 ounces (186 grammes) of meat and 13 ounces (400 grammes) of bread daily, with a liberal allowance of vegetables and fruits, $1\frac{1}{2}$ ounces (50 grammes) of sugar, and 5 ounces (150 grammes) of fat, as a typical diet for a patient with chronic Bright's disease. As regards the value of milk in this disease he points out that it may be given in small quantities and is mainly useful in acute cases and where there is a great failure of appetite, or in large quantities,—and this is a form of treatment much advocated by Germain Sée and others,—or, finally, in moderate quantities in addition to, rather than in lieu of, the mixed diet recommended above.

De Grandmaison ³¹_{Sept. 22, '04} has established a distinction, from a therapeutic point of view, in patients suffering from albuminuria. Though individuals attacked with parenchymatous nephritis or threatened with uræmia, whatever may be the renal lesion which causes it, find a milk diet absolutely satisfactory, it has not the same effect in gouty albuminuria, in which an exclusive milk diet is useless and even harmful, as it does not furnish sufficient nourishment for persons who have to work (and these form the majority of this class of patients). As uric acid is the irritating product of the glomeruli and causes the appearance of albuminuria, the author does not see what influence a milk diet can have on the elimination of the uric acid. He advises that these patients be given an ordinary diet, and in certain cases tonics, such as iron; modifiers of vascular tension, such as strychnia; or substances which act directly on urinary infiltration, such as strontium lactate. The gouty diathesis must also be kept in view, and, in instituting an appropriate treatment, "uricæmia" and irritation of the glomeruli must be avoided, as they give rise to albuminuria.

According to Ried ¹⁹_{Jan. 26, '96} lactate of strontium, which is certainly an excellent diuretic, is beneficial in a large proportion of cases of Bright's disease; at all events, when sclerosis of the kidney has not commenced. It should not be given in powder, as it is liable to provoke nausea, but, when dissolved in the proportion of one to six parts of water, three or four tablespoonfuls can be taken per diem without unpleasant effects.

Polakoff ⁶_{Sept. 14, '96} has found bromide of lithium of great service in Bright's disease, both in the acute and chronic forms. It acts

as a certain and powerful diuretic, diminishing the quantity of albumin in the urine and frequently causing the œdema to disappear entirely. The effect appears to be more marked in acute than in chronic nephritis. As a rule, the drug is well borne. The mixture ordered by Polakoff consists of $1\frac{1}{2}$ to 2 parts of bromide of lithium and 4 parts of bicarbonate of soda in 240 parts of distilled water flavored with peppermint. Of this three or four tablespoonfuls were given daily.

Lowenthal ³¹_{Mar. 9, '96} ⁸⁰_{June 15} has employed methyl-blue in twelve cases of varied forms of acute infectious nephritis. The drug was administered every two days in capsules containing $\frac{1}{3}$ grain (0.02 gramme) each, three doses in a day. It was, in general, well supported except in two cases in which it was taken early in the morning. It never produced pain in the epigastrium or abdomen, and caused no gastro-intestinal disturbance. There was no harmful effect upon the respiratory and circulatory system and no headache; sleep was quiet and urination easy and without pain. The urine assumed a blue tint a few hours after the absorption of the first dose; the depth of the color increased rapidly and persisted for some days after the stoppage of the medicine. The drug augmented diuresis, commencing after the patient had taken 5 to 8 grains (0.32 to 0.52 gramme). Œdema disappeared after eight days of treatment, ascites after ten to twenty days. The albumin in the urine diminished and finally disappeared completely. At the same time the granular epithelial casts and red corpuscles and, finally, the hyaline casts disappeared. In cases of uræmia the author advises the hypodermatic injection of the drug.

Mollière ⁹⁹⁶_{Jan. 25, '96} ⁸⁰_{May 15} employs, in all forms of nephritis, an ointment composed of vaselin (3 ounces—90 grammes) and nitrate of pilocarpine ($1\frac{1}{2}$ grains—0.1 gramme). The only contra-indication to its employment is uræmia. The ointment is well rubbed into the skin, amelioration of the symptoms rapidly taking place. The method must be continued for several weeks. As a result of the treatment an increased action of the skin and kidneys is rapidly produced through its action upon the sweat-glands and the secreting epithelium of the kidney.

Schiperovitsch ³¹_{Apr. 17, '96} has administered the extract of fresh sheep- or pig- kidney, or the kidney itself, to thirty-five patients affected with different forms of nephritis, submitting them, at the same time, to an ordinary diet without any medical treatment. From the results obtained he concludes that the kidneys of animals display an undoubted diuretic action, suppress or greatly reduce the amount of albumin in the urine, and exert a very marked

influence on the general condition, greatly improving it and removing the danger of uræmic phenomena.

De Keating Hart, ³¹_{Oct. 2, '95} remarking the impotence of the different methods of treatment in chronic Bright's disease, calls attention to the favorable results obtained by him in cases of this kind by means of the galvanic current and dielectrolysis with sodium chloride. His method of application is as follows: The positive pole on the nape of the neck, just below the external occipital process; the negative pole a little beyond the lumbar region, to allow the current being conveyed through the kidneys. The positive electrode may be rather small; the negative one must be very large (from six to nine inches). They are soaked in saturated salt solution and placed on the above-named spots. The average strength of the current is from 10 to 15 milliamperes and the duration of each sitting half an hour, to be repeated three or four times a week. According to the author, the electrical treatment has a powerful influence in modifying the lesions of chronic Bright's disease. The mode of operation is twofold,—by a vasomotor and diuretic action and by the decomposition of the sodium chloride of the electrodes and the conveyance of its elements through the skin into the organism.

Walling ¹¹⁵⁰_{Apr., '95} describes the case of a patient suffering from Bright's disease who was also greatly afflicted with excessive hyperæsthesia of the vagina and rectum. Defecation was painful and difficult. Topical treatments having been resorted to without any serious improvement, divulsion of the sphincter ani was decided upon and carried out; but the benefit was in no way commensurate with the discomfort attending and following the operation. It appears, therefore, that this operation, if it may be classed as such, does not exert the beneficial effects in Bright's disease which have been claimed for it by some surgeons.

Dropsy in Renal Disease.

[In a review of the opinions expressed as to the origin of dropsy in renal disease Senator ⁴_{Feb. 25, '95} states that the hypothesis of an inflammation of the subcutaneous and internal vessels is supported both by clinical and anatomical facts. Nephritis is an accompaniment of all infectious diseases and of many intoxications, but dropsy is very rare. Dropsy is, however, regularly met with in the nephritis of scarlatina, chill, malaria, and pregnancy. In these latter it is distinguished by the participation of the glomeruli, while the other kidney diseases are purely parenchymatous, in Virchow's sense of the term. It may be assumed that in the first-named diseases the poison acts injuriously on the vessels, the

glomeruli, in which the blood flows very slowly and under great pressure, being especially influenced. By more severe injury disease of the glomeruli is set up, and through this disease of other blood-vessels, including those of the skin. We must, therefore, assume that in every case of dropsy glomerulitis exists, but that glomerulitis does not necessarily lead to dropsy. As regards therapeutics, each case must be treated individually according to its kind, but it must be borne in mind that the dropsy will continue as long as the tendency to the causative disease remains.—A. R.]

Vasomotor Œdema without Albuminuria.—Tchirkoff⁹²_{Aug., '96} has observed considerable œdema in several cases without albuminuria, the ages of patients varying from 25 to 60. In some the general appearance resembled that of renal disease; in others, and especially the anæmic, the anasarca developed rapidly, the peritoneal cavity filling with fluid, as in cases of cirrhosis of the liver. Renal disease was in all cases carefully excluded. A general loss of hair was noted. The blood was normal, except, in most cases, a reduction of hæmoglobin. There was no evidence of cardiac lesions or of general stasis of the blood. The author refers to a possible nervous origin in the shape of a lesion of the vasomotor centres or nerves. There was a profound alteration in nutrition and, in those recovering, great wasting and exhaustion. The above alteration in the blood serves to distinguish the œdema from that of chlorosis or pernicious anæmia. The author comes to the conclusion that the most probable cause lay in a lesion of the vasomotor system rather than any profound alteration in the blood or in the vessel-walls. In other cases the œdema of the extremities is never very great, but the effusion into the serous cavities and dilatation of the right heart are most constant. He refers to a possible syphilitic origin of the affection and gives details of two cases in which recovery ensued after treatment with potassium iodide.

Tchirkoff recognizes two groups of cases: 1. Acute, with rapid œdema and dropsy of the serous cavities. 2. Chronic, with slow development, trophic disturbance, and venous paralysis. Apart from syphilis, infectious diseases seem to be the most frequent cause, the toxins, in all probability, producing an alteration in the vasomotor centres. The author does not think that these cases can be of lymphatic origin and concludes: 1. Generalized dropsy may occur without albuminuria and in the absence of disease of the heart, lungs, liver, or other organs. 2. It may be called general vasomotor œdema. 3. It may be accompanied by cardiac dilatation and moderate arterio-sclerosis. 4. The blood presents certain alterations in hæmoglobin; these may be trophic

changes and paralysis of the cutaneous veins. 5. The disease is mostly syphilitic and yields to appropriate treatment.

Uræmia.

Symptoms.—McPhedran⁵⁹_{Sept.14,'95} relates a case of acute uræmia followed by gangrenous abscess of the lung. Under treatment improvement took place, followed by recovery. The condition of the lung the author believes to be due to degeneration of the pulmonary artery primarily.

In two cases of chronic nephritis attended by secondary cardiac lesions Moussous³_{Aug.17,'95} has observed, in an advanced stage of the disease, rhythmical spasms of the muscles of the abdominal walls, the patient having no power to control them by his will; they were not modified by any treatment, but increased or diminished in proportion to similar changes in the uræmic symptoms. Any other cause having been excluded, the author regarded these spasms as uræmic accidents.

John Alden Lichty⁹_{May 4,'95} has observed, in four cases of uræmia, a somewhat rare symptom,—namely, intestinal hæmorrhages. At the autopsy of two of his cases no lesion was found other than a submucous extravasation of blood. It seems, therefore, highly probable that the hæmorrhage from the bowel was due to a general oozing of blood from the capillaries and arterioles which lay within the mucous and submucous coats of the intestines; and this tendency to oozing may be due to the extensive sclerosis, which was well marked in the cases referred to.

Fiessinger²¹²_{July 16,'95} reports two cases of explosive uræmia of sudden onset and short duration, occurring in brothers. In neither case were there any signs of arterio-sclerosis. The symptoms were necessarily attributed to a temporary congestion of the kidney.

According to Courdoux,^{2000 126}_{'94 ; Apr.15,'95} hyperpyrexia may appear in the course of renal insufficiency, and is due to the retention of thermogenic substances formed in the organs and to the resorption of a product furnished by the kidney. These substances give rise to hyperpyrexia by acting upon the thermogenic nervous centres. The hyperpyrexia may exist alone, but is often attended by auto-toxic encephalopathy.

Allemand²²⁸_{July 15,'95} relates a case of uræmic hemiplegia due, as shown by autopsy, to an intra-cranial serous effusion.

Treatment.—Gonin⁸⁶⁸_{Dec.22,'94} recommends subcutaneous injections of nephrin (50 per cent.) in cases of severe uræmia. He has obtained from this method the most satisfactory results in a case where every other remedy had remained without effect.

Renaut⁷³³_{Mar.14,'95; Apr.6} endeavors to overcome renal impermeability by the application of leeches to the loins, which he greatly prefers to wet cupping for this purpose. Inhalations of oxygen may be of use in aiding the blood to oxidize the retained toxic products. To increase the circulation in the kidney the muscular substance of the heart must be stimulated, and for this purpose the author prefers the administration, every four days, of 0.001 gramme ($\frac{1}{64}$ grain) of crystallized digitaline, to be continued even after the renal obstruction has been removed. A milk diet, although it usually increases the daily amount of albumin secreted in the urine, is to be preferred on account of its diuretic action and because it is a diet yielding very little toxic residue. During the uræmic attack subcutaneous injections of ether act as a cardiac stimulant and to some extent render the nervous system insensible to the action of the toxic agents of uræmic origin.

Suppurative Nephritis.

Nicolaier,⁵⁰_{Oct.13,'04} in a case of suppurative nephritis, found a new pathogenic capsulated bacillus especially characterized by the fact that its inoculation into mice does not give rise merely to a simple septicæmia, but almost always to a metastatic nephritis. The author supposes that, in the case in question, the bacillus had started from the inflamed bladder and from thence had wandered up to the kidneys.

According to Wunscheim,⁸⁸_{Jan.15,'95}¹²⁶_{Jan.15} suppurative pyelonephritis is due, in the majority of cases, to the bacterium coli commune, and in the minority to the proteus or to the ordinary pyogenic microbes. When these last are the agents of renal suppuration the disease almost always ends in pyæmia. Pyelonephritis caused by staphylococci and streptococci is not only characterized by concomitant pyæmia, but also, on microscopical examination, by a more marked tissue-destruction and absence of local reaction. It seems that the anatomical type of ascending suppurative pyelonephritis may be realized even by a descending process,—that is, by the passage of micro-organisms from the bladder into the blood-vessels, which convey them into the kidneys.

Follet¹¹⁵³_{Feb.6,'95} related to the Société Anatomique of Paris the case of a woman, 26 years old, showing the symptoms of suppurative nephritis of ten years' standing which was thought to have been caused by typhoid fever. The patient was operated upon, and, simple incision not having been sufficient, nephrectomy was performed. The kidney was found enlarged and divided into several pouches filled with purulent urine; these pouches barely communicated with each other,—a fact which explains the insufficiency of

the first operation. The pus, bacteriologically examined, contained streptococci and staphylococci. It was, therefore, not possible to affirm the typhoid origin of the renal suppuration.

Perirenal Abscess.

Werner ³⁵⁷_{Oct. 28, '94} records four cases of perirenal abscesses in which operative interference was followed by full recovery. In one of the cases pulmonary symptoms set in ten days after the operation, and physical examination showed the presence of a pneumothorax due to bursting of the purulent collection through the diaphragm. The author holds that in most cases of this kind a causal relation exists between these retroperitoneal abscesses and pleural exudation, whether it be through pouring out of the pus through a perforation of the diaphragm or through propagation of the infectious inflammatory process.

Buscarlet ³¹_{Jan. 30, '95} operated upon an enormous perirenal phlegmon in a child 20 months of age. The disease had begun, some time after a fall, with fever, anorexia, hæmaturia, vomiting, and constipation. The tumor extended from the angle of the left scapula to the iliac crest, and the purulent collection had penetrated as far as under the skin. Incision gave issue to a large amount of pus mixed with blood and was followed by recovery.

The results obtained by Schnitzler and Savor, ⁴⁵¹_{Mar., '96} in a series of experiments upon dogs, go to show that the injection of dead bacteria, especially *proteus vulgaris*, does not produce visible suppuration in the kidney, but only a round-cell infiltration. The unwounded epithelium of the pelvis of the kidney and ureters is no protection against the influence of dead micro-organisms; in short, their experiments demonstrate that dead bacteria injected into the pelvis of the kidney may produce a diffuse interstitial nephritis.

Tuberculosis of the Kidney.

[According to du Pasquier, the most important symptoms of primary renal tuberculosis are, in the order of their appearance: polyuria; hæmaturia,—compared to the hæmoptysis of beginning pulmonary tuberculosis, and of which the endoscope may establish the renal or vesical origin; intermittent renal pains,—true nephritic colics connected with the discharge of tuberculous material in the pelvis and the ureters; modifications of the urine (presence of pus, acid reaction, rarity of albuminuria, and frequent presence of Koch's bacillus), and the presence of a swelling in one of the flanks. The diagnosis, difficult at the onset, becomes easier when physical symptoms make their appearance. Two forms of

renal tuberculosis may be distinguished: the one, more frequent, in which the infection takes place through the blood-current, and the other starting from the ureters,—urinary ascending infection consequent on tuberculosis of the bladder and genito-urinary organs.—A. R.]

From his personal experience F. S. Watson ⁹⁹_{Feb. 7, '95} inclines to the belief that genito-urinary tuberculosis is overlooked more than any other disease because of the readiness to remain content with a diagnosis of "idiopathic cystitis" in cases in which pyuria and irritable bladder are the conspicuous symptoms and in which a few microscopical examinations of the urinary sediments fail to show casts, renal epithelium, or crystals, the latter fact being often assumed to free the kidneys from the suspicion of being involved. On the contrary, the author believes that "idiopathic cystitis," in the sense of a spontaneously occurring inflammation of the mucous membrane of the bladder, does not exist, and that when the ordinary causes of cystitis (gonorrhœa, stone, stricture, ingestion of certain irritating drugs, some diseases of the spinal cord, etc.) are absent, the symptoms of cystitis are strongly suggestive of tuberculous disease in the genito-urinary tract, the bladder being rarely the starting-point. Among the symptoms which more directly point to this diagnosis are: the bladder-irritability; the presence of a hard lump in one epididymis, especially if the patient has never had gonorrhœa nor received an injury; the early appearance of blood in the urine, generally in the form of small clots, followed by that of purulent and occasionally caseous matter, without the exceedingly foul smell often noted in the urine of some cases of chronic cystitis in connection with prostatic hypertrophy or malignant disease of the kidney and bladder; the pain in urination, becoming almost intolerable as the disease advances. Such a symptom-complex is, in the absence of any of the special causes mentioned, highly suggestive of renal or vesical tuberculosis, particularly if occurring in a male under 50 years of age. Two strikingly characteristic features are: the extraordinary remissions in the severity of many or all the symptoms; the entire failure of ordinary medicinal remedies to relieve the bladder-symptoms, and the positive aggravation of the latter by local treatment, such as bladder-washes, deep urethral injections, or the passage of instruments. To establish the diagnosis there remain the discovery of the tubercle bacilli and the cystoscopic examination of the bladder.

Pousson ¹⁸⁸_{Mar. 3, '95} records a case of primary renal tuberculosis in a man 25 years old. The symptoms were hæmaturia, beginning suddenly without any previous morbid history and continuing for

seven months, the blood being intimately mixed with urine and showing, on microscopical examination, leucocytes and Koch's bacillus in great numbers. Nothing abnormal having been found in the bladder, the seat of the lesion was necessarily located in the kidneys, although they were neither painful nor enlarged. Internal treatment—nephrectomy having been refused by the patient—with astringents, sodæ arsenias, and saline baths produced some good result, the hæmaturia becoming less frequent and abundant and the general condition better; but examination through the rectum showed a beginning infiltration of the prostate and seminal vesicles. The urine became purulent and did not clear on standing. The author compares his case with those described by Czerny, Habershon, Tuffier, and Routier, in which the hæmaturia was for a long period the only sign of renal tuberculosis, and inclines to think that hæmaturia, in some forms of the disease, may be regarded as an indication of nephrectomy.

Ernst Meyer²⁰_{Sept. 5, '96} describes the microscopical appearances of six cases of what, in a previous work, he had designated as "excretion tuberculosis." In disseminated miliary tuberculosis of the kidneys the tubercular foci of the medullary substance are due to an excretion of tubercle bacilli from the cortex through the urinary canals. That cortical tubercular foci originating in the glomeruli or blood-vessels may propagate by softening and bursting in the urinary canals is highly improbable. More frequently tubercle bacilli, owing to the high tension existing in the glomeruli, are pushed into the urinary canals and give rise to tubercular foci in the medullary substance; so that this localization of the disease must be considered as an "excretion tuberculosis."

Carpenter⁵¹_{Apr., '96} describes the case of a child, 1 year and 9 months old, who was brought to him for "wasting and bad cough" and who suffered from diarrhœa and passed a quantity of thick and milky urine. On examination a large, firm, globular tumor was felt, occupying the left side of the abdomen and reaching to the left iliac fossa. The patient died and the diseased organ was removed at the necropsy. The pelvis of the kidney was greatly dilated and filled with pus, as were also the calices. There were numerous tubercular abscesses in the kidney-substance in which tubercle bacilli were demonstrated.

Loomis⁵⁹_{Aug. 3, '96} presented to the New York Pathological Society specimens from a man, 20 years of age, in whom a chronic tubercular process was found in both kidneys, and in the bladder, where it seemed to be secondary. Two weeks after an attack of gonorrhœa he began to suffer from daily chills, unaccompanied by sweating, and steadily lost flesh and strength. Urination was quite fre-

quent and the urine was straw-colored, acid, and contained albumin and hyaline casts; bacteriological examination showed the presence of tubercle bacilli. The patient complained of pain in the lower portion of the abdomen and also on micturition. Three or four days before his death his temperature rose quite rapidly.

Grancher, ²¹²_{June 10, '96} in describing a case of urinary tuberculosis in a child, remarks that, although bacteriological examination of the urinary sediments allows tuberculosis of the urinary organs to be recognized, it does not furnish sufficient indications for distinguishing vesical from renal tuberculosis,—a matter which is of great practical bearing as regards surgical intervention. Among the symptoms pointing especially to an affection of the kidneys, Grancher cites nephritic colic and hæmaturia occurring during and not at the end of micturition, as in vesical hæmaturia; so that a nephritic colic ending in a discharge of purulent urine mixed with blood may be considered as a very probable sign of renal tuberculosis.

Freyhan ¹⁴_{Dec. 23, '94} showed to the Society of Internal Medicine of Berlin specimens from a man who had died from urogenital tuberculosis. It was remarkable that all the organs—kidney, ureter, seminal vesicle, prostate, and half of the bladder—of the left side were involved, while those of the right were not affected. The explanation of this would probably be found in the fact that the right testicle had been removed four years before for tubercular lesions.

F. S. Watson ⁹⁹_{Feb. 7, '96} states that, as to surgical treatment of the disease, the outlook is not hopeful, but it may sometimes avert immediate danger and relieve pain. The rational plan would seem to be to make an exploratory nephrotomy and to act according to the conditions found; for example, if the disease should be confined to a well-defined area of the kidney, not too extensive, a resection of that portion of the organ might be best. The patient's strength and the usual considerations that govern the surgeon in deciding whether it is safe to proceed to a grave operation after an exploratory one will determine his course.

Renal Colic.

According to Senator, ⁴_{Apr. 1, '96} renal colics (nephralgias, or neuralgias of the kidneys) occur without any demonstrable affection of the kidneys, either secondary or primary. To the first class belong the nephralgias of tabes and hysteria. Primary renal neuralgia is exceedingly uncommon and only to be admitted when unaccompanied by any recognizable cause of the pain, as renal calculi, foreign bodies, tumors, and abscesses. Therapeutically, operative inter-

vention in those forms of intense neuralgias which do not yield to ordinary measures is always followed by good results. To what this effect is due the author does not know, but it is probably to be compared to the success sometimes obtained by nerve-stretching in cases of tabes and neuralgias.

Hydronephrosis.

Launay ¹⁴_{Jan. 13, '96} reports a case of double hydronephrosis in which, after operation, the kidneys were found seriously damaged (the left one being almost totally destroyed) and a loop was found in the right ureter limiting the flow of urine through it.

G. H. Goodger ⁵⁹_{May 18, '96} publishes a case of intermittent hydronephrosis probably due to movable kidney and the appearance of which was not preceded by injury. A pad made and worn over the left lumbar region produced some amelioration by lessening the frequency and also the duration and severity of the attacks. The ultimate result was not known.

Martin ¹¹⁸_{June, '96} gives the history of a child of 2 years who was brought to the hospital for a progressive enlargement of the abdomen which physical examination and exploratory puncture showed to be due to a right hydronephrosis. No cause was discoverable in the history. Lumbar nephrectomy was performed and showed congenital narrowness of the right ureter at the level of its renal insertion,—this explaining the hydronephrosis.

Gervais de Ronville ⁷_{No. 16, '94} showed to the Société Anatomique of Paris specimens from a case of hydronephrosis for which total abdominal nephrectomy had been practiced with the best results.

Last year Albarran ³_{Jan. 27, '94} contested current opinion that closed hydronephrosis always passes through an open stage. A septic ligature of the ureter determines atrophy of the kidney, as shown by Straüs and Surmount, but it is preceded by stasis and dilatation of the excretory canals. Ligature first increases pressure, which may rise at the end of four hours to seventy-five millimetres of mercury and be accompanied by renal congestion and even hæmorrhages and œdema of the parenchyma; urine diminishes and proportion of urea.

Movable Kidney.

Legry ¹⁷_{Mar., '96} notes that within the past few years the ideas as to the pathogeny of movable kidney have been much modified. The kidney, by its anatomical position, is evidently exposed to displacements, but these, in turn, depend on a general morbid state,—a particular diathesis. In the author's opinion, some of the determining causes adduced—as pregnancy, menstrual dis-

orders, and lesions of the genital organs—are not worthy of the importance which has been assigned to them. Other causes are traumatism, alteration in the kidney, pressure from neighboring tumors, and the influence of wasting diseases,—tuberculosis, typhoid fever, etc. The question of pathogeny is still unsolved, and too much importance must not be attached to Glénard's theory of enteroptosis or a general syndrome, of which nephroptosis is only an isolated symptom. According to the author, nephroptosis is usually amenable to a bandage and calmatives and only exceptionally requires surgical intervention.

W. R. Stewart ⁵⁹_{Feb. 9, '96} reports the case of an infant of 8 months who had swallowed some pieces of plaster and who suffered afterward from intestinal obstruction. After thirty-six hours of ineffectual treatment the author was called upon to operate. Though the abdomen was quite tympanitic, a distinct movable tumor could be felt on the right side, and was believed to be the obstructed gut. Upon opening the abdomen it was found to be a floating kidney, while the obstruction was located in an intussusception in the left hypogastric region. The child had never suffered any inconvenience from the kidney, nor had the tumor been discovered before by the mother. The author believes this to be the youngest case of floating kidney yet reported.

Wilson ³⁹_{Mar., '96} reported to the Toronto Medical Society the case of a woman who, while hanging out clothes, slipped, dislocating the right kidney. It could be palpated easily and was swollen and tender. After rest in bed for a few days the symptoms disappeared and she gradually recovered her usual health. The author has not heard of these cases being detected so soon after the accident.

Küster ⁶_{Apr. 27, '96} is of opinion that movable kidney always arises from mechanical causes. During respiratory action, especially in women who wear tightly-laced corsets and whose abdominal walls have become thin by reason of repeated pregnancy, the ribs exercise a pressure which, in course of time, loosens the kidney. Direct violence, such as a fall or blow, may also be the cause of the displacement.

Stuart Tidey, ²_{May 4, '96} after remarking that movable kidney is frequently overlooked, describes seven cases of this condition,—one in a male, the remainder in females. In most of these the author was unable to trace any causal relationship with tight lacing; on the other hand, four of them occurred in patients who had indulged in violent exercise.

Kendal Franks ²²_{Aug. 14, '96} says that, in order to discuss the origin of movable kidney from the stand-point of absolute fact, the forces

which keep the kidney in its place should be ascertained. Researches of Cunningham show that the relation of the kidneys to the surrounding abdominal viscera bears very closely upon the movability of the former. The right kidney is kept in position by the pressure of the liver above and that of the intestines below, and the left by the spleen and intestines, respectively. The assumption that the fatty capsule of the kidneys is largely concerned in keeping the organs in position is not well founded, because the fatty tissue is not solid in the living state and cannot, therefore, afford much support to the kidneys. Dislocation of the right kidney is due to the loss of balance between the pressure of the liver above and that of the intestines below. Thus, after parturition the displacement of the abdominal viscera caused by the gravid uterus is not unlikely to result in some renal mobility. If the patient be allowed to leave her bed too soon the pressure from above is considerably greater than the support afforded by the intestines below; consequently, in these cases much depends upon the integrity of the connective bed in which the kidney lies. Unless, therefore, the renal connective tissue is equal to the strain, the kidney becomes more and more displaced. The relative position of the kidneys, to a large extent, explains the difference in the symptoms to which the organs, when movable, give rise. Thus, there should be no symptoms caused by a movable kidney on the left side, while, in the case of the right kidney, the symptoms are more or less pronounced. There are malaise and abdominal pain; also abdominal distension, beginning about two hours after food, and gastric crises. The only effectual method of relief is by surgical interference.

Tumors of the Kidney.

[According to Rovsing, it would be quite possible to improve the statistics of mortality in operations for renal tumors if the diagnosis could be established with certainty at an earlier period. For the most part, a renal tumor is not operable when it becomes accessible to palpation, for then it has grown enormously, its adhesions are numerous, and the operation is difficult and dangerous. In order to make the diagnosis early the physician must pay the greatest attention to the symptoms of hæmaturia, make frequent microscopical examinations of the urine for bacilli, crystals, and cancerous elements, and finally explore the kidney directly by means of a lumbar incision. When nothing indicates the side in which the disease is seated, Rovsing advises incising "at a venture," since cancers of the kidney occur on the right as frequently as on the left side; if the kidney first exposed look healthy, the

other side may be explored in the same sitting. It is only by early nephrectomy that a radical recovery can be hoped for.—A. R.]

Leguen, of Paris, ¹¹⁵³ Aug. 17, '95; ¹⁵ Oct. has discussed varicocele as a symptom of tumor of the kidney. The compression of the spermatic vein by the growths suggests itself immediately as the most likely cause, and some observations seem at first to support such an idea. The matter is, however, not quite so simple, since, if the dilatation were due to that cause, it ought also to be present equally often in all the other conditions of enlargement of the kidney, which is not the case; and, if the varicocele were due to the gradual increase of the tumor, its size would vary directly with that of the growth. It is a fact, however, that, although present in some cases where the tumor itself can scarcely be felt, it is occasionally absent even where the growth is very large; again, it is not due to the extension of the tumor-substance in the vein, since, although this does occur, it is never an early symptom, and would not explain the existence of a varicocele on the right side, where there is no connection between the spermatic and the renal veins, the former opening directly into the vena cava. An opportunity presented itself to the author to examine one of these cases post-mortem, and he found that the venous distension was due to the pressure of enlarged lymphatic glands, and not at all to the tumor, although it was of enormous size. One peculiarity of symptomatic varicocele is that it is not progressive, and the reason assigned for this is that at the lower border of the kidney the spermatic vein always communicates with those of the renal capsule or of the ureter. Whatever may be its explanation, this symptom is one of considerable prognostic importance, the co-existence of varicocele with hæmaturia being always suggestive of a grave, if not cancerous, enlargement of the kidney.

Carcinoma.—A case of primary carcinoma of the kidney, in which autopsy confirmed the diagnosis, is described by Martin. ²⁸² Dec., '94 The tumor infiltrated the medullary portion, filled the pelvis, and extended to the suprarenals.

Tuffier ¹⁴ Dec. 2, '94 operated upon a man, 65 years old, who was subject to long-standing hæmaturia with pains in the right flank, where a large and smooth swelling was recognizable. The kidney having been exposed, it was seen that the swelling was due, in the greatest part, to a pouch distended by a large amount of blackish blood, under which was an epitheliomatous induration compressing the origin of the ureter. The diseased kidney was enucleated. Six weeks later the patient died from broncho-pneumonia, and at the autopsy secondary carcinomatous nodules were found in the liver. A similar case is described by Levi. ⁷ No. 16, '94

Sarcoma.—Steele ⁵¹_{Aug., '95} reports four cases of sarcoma of the kidney in children occurring in his own practice and reviews carefully other recorded cases. According to him, these new growths are often congenital, usually unilateral, and primarily extra-renal, surrounding rather than infiltrating the renal tissue. The round-celled is the most common form. They are of exceedingly rapid growth and destroy life through exhaustion. Nephrectomy offers the only hope of cure or of prolonging life in these cases. The extra-peritoneal route is preferable when the tumor is small; when large, a transperitoneal incision is imperative.

A case of primary sarcoma of the kidney in a child aged 11 months is described by Mackintosh. ⁶_{June 1, '95} The symptoms in this case were constipation, nausea, and gradually-increasing weakness following, in a few days, the discovery, by the child's mother, of a small swelling in the left side of the abdomen. The previous history was negative and the family history uneventful. Owing to the difficulty of collecting the urine, the child being a female, the presence of blood was uncertain, though on one occasion the secretion was distinctly bloody. Sickness continued whenever food was given, sleep was absent, and the child remained quite conscious until just before her death, which took place on the eleventh day after the commencement of the symptoms. At the post-mortem examination a smooth, kidney-shaped swelling was seen, about the size of a closed fist, and on its removal two or three dark blood-cysts were found on the surface of the organ. Histologically it was a round-celled sarcoma.

Bérard ²¹¹_{Nov. 11, '94}; ⁶⁷³_{Jan., '95} describes a case of sarcoma of the kidney weighing about 3 kilogrammes (6½ pounds) developing within four or five months in a child 5 years of age without causing hæmaturia, varicocele, or any urinary trouble. The patient died from extreme emaciation before any surgical intervention could be attempted. The child, some six months previously, had fallen, striking violently on the lumbar region; since that time he had failed in health, while the abdomen increased in size. At the post-mortem examination it was found that there were also metastatic deposits in the liver and peritoneum, showing that surgical treatment would have been of little value owing to the rapid generalization of the tumor.

Mollison ²⁸⁵_{June 20, '95} showed to the Medical Society of Victoria specimens of an extensive alveolar sarcoma of the left kidney which weighed 1 pound 9½ ounces and measured 6½ inches in length by 4 inches in breadth. The pelvis and ureter were completely blocked with the new growth. The patient, a man of 62, had only noticed the swelling about six weeks. He had also

noticed blood in the urine and loss of weight. He had no pain, except on coughing. His recovery after nephrectomy was uninterrupted.

Brock²⁰_{June 1, '95} describes a large tumor found at the autopsy of a child 3½ years old. It occupied almost the whole abdominal cavity and was intimately connected with the right kidney. Microscopical examination showed it to be a rhabdomyoma originating in the perirenal tissues.

Cysts.

Hydatid Cysts.—W. Gairdner¹¹⁸⁷_{Aug., '94} holds that these cysts are extremely rare, not comprising more than a fraction of 1 per cent. of all cases of hydatids. The symptoms are not characteristic and the diagnosis, therefore, is difficult, except when the cysts have ruptured into the pelvis of the kidney, thus allowing their peculiar elements to be found by microscopical examination of the urine. In the case of an unruptured cyst connected with the kidney an absolute diagnosis can never be made except when hydatid fremitus has been obtained or when, for purposes of differential diagnosis, a small amount of fluid has been withdrawn through an hypodermatic syringe.

Cystic Degeneration.—According to Gallois,⁹⁹⁶_{Apr. 10, '95} cystic degeneration of the kidney is a rare disease, and, as it does not require surgical interference, it is important that it be recognized in order to avoid unsuitable treatment. Unhappily, its diagnosis is difficult, the tumor being not always clearly recognizable and the disease evolving as an interstitial nephritis. Among the symptoms which may aid in distinguishing cystic degeneration from this and some other renal diseases (cancer, hydronephrosis, hydatid cysts) are the following: pain, which is dull and sometimes bilateral, rarely resembling that of nephritic colic; anuria, which is the rule toward the end, with a slight density of the urine; the physical characters of the tumor, which is rarely fluctuating and very frequently exists in both sides.

Pye Smith²_{Dec. 8, '94} related to the Pathological Society of London the case of a young man who was in good health until fourteen days before death, which took place from uræmic coma. At the autopsy a cystic degeneration was found in the kidneys. Most cases of this kind remain undiagnosed or present the clinical features of chronic Bright's disease.

G. Demantké⁷_{Nov. 15, '94} describes a case of cystic degeneration of the kidneys showing the insidious development of this lesion, which had not been suspected during life owing to the lack of symptoms of renal disease. Aside from a certain degree of inter-

stitial nephritis and of perivascular lesion, nothing was discovered at the microscopical examination enabling him to decide if there were a simple enlargement of the urinary canals or an epitheliomatous production analogous to the cystic disease of the breast.

A. P. Clarke⁹⁹_{Jan. 3, '95} relates a case of cystic degeneration of the kidneys evolved without any peculiar symptom. The patient, a man 65 years of age, had suffered, eight years previously, from the effects of an abscess in the abdominal wall involving the peritoneal cavity; the abscess had been opened and after some time the patient had been discharged as entirely cured. He remained apparently well until about three years before the author was called, when he began to suffer from gastric disturbance and was unable to follow his trade as easily as before, becoming much worse in the last three months. When the author made his first visit he was in bed and showed weak heart-action, marked ascites, with considerable œdema of the lower extremities, and complained much of dyspnœa. Clarke suspected a disease of the kidney, mesentery, and peritoneum, any cardiac lesion having been excluded owing to the lack of physical signs. The examination of the urine, frequently repeated, always gave a negative result. In spite of this the author could not help feeling that there was more or less advanced renal disease. The patient was relieved somewhat by treatment, but afterward grew worse and died. Post-mortem examination showed tubercular infiltration of the peritoneum and mesentery, nothing abnormal in the heart and lungs, considerable fluid in both sides of the chest. The right kidney was much enlarged and had undergone cystic degeneration. The left kidney was nearly normal. Such a condition of the kidneys explained the negative results of the several examinations of the urine. The left kidney being normal, or nearly so, the urine secreted by it was naturally normal; the right kidney having undergone extensive degenerative changes and the glomeruli having also been destroyed, there could scarcely be expected to occur any real loss or escape of albuminous elements and other products significant of nephritic lesion. The author remarks that it would seem important to bear in mind that such particular changes in the kidneys may take place, and that in any case of obscure abdominal disease the existence of such a possible condition should not be left unconsidered.

Traumatism of the Kidney.

Cases of traumatic rupture of the kidney are recorded by Sourdille,¹⁴_{Nov. 28, '94} Roux,³¹_{Jan. 30, '95} Kölliker,¹⁴_{May 5, '95} and Güterbock.³_{July 3, '95} In the case of Sourdille the left kidney was found ruptured on post-

mortem examination of a man, 74 years old, who had been crushed under a carriage. Of the three cases described by Roux rupture followed crushing in one case and a heavy fall in the two others. Kölliker's case was that of a boy who had been thrown into the air by four other boys and had fallen striking the lumbar region. Güterbock has collected thirty-six cases of renal lesions of traumatic origin. He says that an abundant hæmorrhage may take place without any rupture from tearing of the vascular net-work surrounding the organ, and which sometimes becomes engorged.

Tuffier and Levi ³¹_{Mar. 23, '96} refer to the existence of perirenal uræmic effusions following injuries to the kidney. The blood effused partly discharges into the ureter and partly gains access into the perirenal tissue, owing to the high tension of the urine, which is sometimes increased by a clot blocking the ureter and forcing the blood to flow back toward the perirenal zone. When extravasation is great the blood forces its way through the scar of the kidney or pelvis into the ureter, and fresh hæmaturia follows, this not being due to a secondary hæmorrhage, as was believed, but to the emptying of the primary collection. The remainder of the extravasation is slowly absorbed. The evolution of these effusions is generally aseptic, and they are, hence, to be treated only by compression and urinary and general antisepsis.

Perirenal Hæmorrhage.

Francis Hawkins ²_{Nov. 10, '94} showed to the Pathological Society of London the kidneys of a man, 31 years old, who had died with symptoms of cardiac insufficiency. The left kidney was imbedded in an extensive blood-clot, which lay chiefly in front of it; there was a similar extravasation on the posterior aspect of the right. The author had not discovered any aneurism to explain the hæmorrhage. There were infarcts in the lungs and spleen.

Pyonephrosis.

Tilden Brown ⁴⁵¹_{May, '95} describes three cases in which there was clinical evidence of a diseased condition of one kidney (pyonephrosis), and, upon removal, septic lesions were found. Bacteriological examination of the urine and kidneys gave pure cultures of the bacillus coli communis, which was the only ascertainable cause of the disease. The general health and weight of each patient improved after operation. The colon bacillus persisted in the urine long after recovery. In two of these cases the gross septic lesions of the kidney were mainly on the surface, suggesting an arterial deposition of the contagion rather than a urethral ascension. From these facts the author infers that the colon

bacillus, under certain circumstances, becomes pathogenic when it gains access to the kidney either by the blood or the urethra.

Hogge²⁵⁶_{Nov. 11, '94} relates a case showing signs of intermittent pyonephrosis with cystitis and ureteritis. The patient suffered, in addition to other symptoms, from attacks of retention of urine, during which the ordinary purulent deposit in the urine disappeared.

Von Kahlden³¹_{Jan. 20, '95} reported to the Medical Society of Fribourg two cases of this rare and much debated disease, and supported the possibility of its being of parasitic origin by showing some corpuscles found in the liquid of the cysts.

H. P. Loomis⁵⁹_{Feb. 23, '95} presented to the New York Pathological Society an unusual specimen of calculous pyelitis. Both kidneys were moderately enlarged and of a red color, and on section the renal substance was found to be almost entirely destroyed, its place being occupied by large cysts communicating in each kidney with an excessively dilated pelvis and calices. The cysts contained a thin, turbid fluid, apparently urine, with some pus. From eight to fifteen calculi were found in each kidney, and they were so large as to fill the pelvis, calices, and a number of the cysts in the right kidney. The pelves of the kidneys showed none of the evidences of pyelitis, which could be accounted for as a primary condition. An interesting point in this case was the absence of renal symptoms during life.

DISEASES OF THE BLADDER.

Cystitis.

Davezac¹⁸⁸_{Nov. 1, '94} has observed two cases of acute cystitis in which a rheumatic origin seemed undeniable, an acute articular rheumatism following its regular course before, during, and after the vesical affection.

Wertheim⁴¹_{p. 1133, '95; July 6, '95} related to the Vienna Medical Society the case of a patient, affected with gonorrhœal cystitis, from whom he had made a preparation of a part of the mucous membrane of the bladder. This showed, on microscopical examination, gonococci in both epithelium and connective tissue. In the submucous connective tissue the capillaries and blood-vessels were found to be filled with gonococci, partly involved, partly characteristically tinged. Gonococci may enter the blood either indirectly through the lymphatic system or by direct penetration into the blood-stream at the place of the primary patch. This explains the origin of gonorrhœal endocarditis and other gonorrhœal sequelæ.

Goldberg⁴¹_{p.117,'96}²_{Aug.3,'96} describes a case of chronic gonorrhœal cystitis which had lasted a year and a half and rapidly disappeared after an attack of influenza. Possibly the toxins of influenza had so impaired the vitality of the micro-organisms setting up the cystitis as to render their further development impossible.

Mathieu⁹²⁷_{Mar.22,'96} communicated to the Société Méd. des Hôpitaux, of Paris, some cases in which irritation of the bladder, cervical cystitis, and even hæmaturia followed the use of large doses of bicarbonate of soda in dyspepsia; and he warned against the dangers of this treatment unless proper attention was directed to the peculiar conditions of each patient. In discussing Mathieu's communication Hayem remarked that such a danger might easily be avoided if, before prescribing the alkalies, the acidity of the urine were measured. When the urine is very acid, bicarbonate of soda cannot be hurtful, while if it be but slightly acid an intensive alkaline treatment might greatly increase the alkalinity of the urine to such an extent as to allow development of microbes contained in the bladder.

In two cases of cystitis in women that had resisted all treatment A. Galbraith Faulds²¹³_{Oct.,'94} obtained a favorable result with the following treatment: He injected the bladder with a solution of cocaine, cut a long strip of boric lint having a bulk when rolled up of the size of a large orange, and introduced it carefully through the urethra into the bladder by means of an aural speculum, leaving two ends outside to act in drainage of the urine. The lint was left in for several days. The agony was very great for the first twenty-four hours, but after the removal of the pack, which was withdrawn with the greatest care, no symptoms of the disease recurred. According to the author, the above method is successful because it gives the bladder a true rest and exerts, thanks to the boric acid in the lint, a soothing effect which assists in no inconsiderable degree in the success of the treatment. For evident reasons this form of treatment is at present impracticable in the male.

Tumors of the Bladder.

Arbuthnot Lane²_{May 18,'06} relates a case of extensive nævoid growth of the mucous membrane of the bladder in a female child, aged 3½ years, who, two years previously, had commenced to pass bloody urine, these hæmaturias afterward continuing in variable degree and being at times so profuse that the child appeared to be in great danger. There were scattered about the anus and buttocks a few small patches of degenerated nævoid tissue, which had led him to diagnose the condition of the bladder as being also

nævoid. The bladder, greatly enlarged, having been opened above the symphysis, several large nævoid masses protruded through the incision. They were mostly soft and bled very readily. Almost the whole of the mucous surface was affected. It seemed unwise to attempt to include masses of the growth in ligatures. The author, therefore, closed the incisions into the bladder and skin, intending to interfere subsequently should styptics, applied locally, not have the desired effect. Strychnine was used for this purpose and, happily, succeeded, the child's condition rapidly improving.

Terrier and Hartmann, ³⁶_{June, '95} from an investigation of sixteen indisputable cases of true myoma of the bladder, contribute some considerations upon this class of tumors. While unable to throw light upon the etiology, they have no doubt as to their complete analogy with uterine fibromyomata. The growths arise in the thickness of the muscular coat, tend to become encapsulated, and may develop outward or toward the mucous surface, the latter being much the more common. They vary greatly in size, are usually rounded and more or less lobulated, exceptionally taking the form of an infiltration. On section they are grayish, showing interlacing fibrous stroma with soft masses between; microscopically they show an interlacing net-work of bundles of smooth muscular fibres separated by connective tissue. The mucous membrane over the tumor is at times healthy, but usually inflamed, even ulcerated.

Enuresis.

Stumpf ⁴¹_{p.1001, '95; Sept.7} thinks the cause of nocturnal incontinence of urine is purely mechanical,—namely, the pressure of the abdominal organs, which during sleep often lie above the bladder; so that the contained urine presses on the vesical orifice of the urethra. He removes this pressure by placing a pillow under the child's pelvis, thus raising it so that it forms an angle of from 130 to 150 degrees with the spinal column as the latter rests horizontally on the bed. A very low pillow is placed under the head.

Chéron ¹⁷_{Mar.80, '95} divides the treatment into: 1. Mechanical. This is usually considered useless and brutal, but the meatus may be occluded by collodion at bed-time, which can be removed in the morning, or an elastic bag may be introduced into the rectum or vagina.

[The practical applicability of this method is not easy to understand.—A. R.]

In cases where incontinence is due to insufficiency of the vesical sphincter good results are obtained by lifting the foot of the bed at night. 2. Hygienic treatment. The amount of liquid

should be limited and none taken with the evening meal. Cold perineal douches should also be given. The child may be wakened once or twice during the night. The sphincter may be educated by retaining the urine as long as possible in the day. 3. Moral treatment. The child should not be punished. Hypnotic suggestion has been tried in a number of cases with excellent effect. 4. Medical treatment. Belladonna and atropine can be used in such a way as to produce the full physiological effect. Strychnine in full doses can also be given with good results. Antipyrin, 30 grains (2 grammes), may be given in the course of ten days. Chloral and bromides may be given where there is sensitiveness of the mucous membrane of the bladder. 5. Electrical treatment. Either the constant or faradic current may be used and must be applied directly to the sphincter. Massage of the sphincter directly, by introduction of one finger into the rectum, may also be practiced.

In a case in which all ordinary remedies had failed Kelaiditis²¹² June 10, '95 employed, with good result, ammoniacal sulphate of copper (0.2 gramme—3 grains—to 15 grammes— $\frac{1}{2}$ ounce—of water),—3, 4, or 6 drops twice a day.

F. F. Rowland⁴⁴ Aug., '94 regards quinine as the physiological remedy for enuresis when circumcision fails. Potts, of Philadelphia, had previously observed that, in cases of chorea in which enuresis was a complication, the administration of quinine seemed to act favorably on both the chorea and the enuresis.

The unpleasant smell emitted by persons suffering from incontinence of urine can be conveniently covered, according to Emminghaus,⁵¹ Jan., '95 by means of 10-drop doses of turpentine, administered in milk or water, three times a day. The remedy is perfectly harmless and may be given for many weeks at a time without any inconvenience. It is, however, contra-indicated in ulcer of the stomach, gastric catarrh, and nephritis, and also in some persons in whom turpentine tends to upset the digestive functions.

Anuria.

P. J. Hensley¹⁰⁷⁷ Oct. 10, '94 describes the case of a boy, aged 7, who was admitted to St. Bartholomew's Hospital the first time with signs of malnutrition and intestinal distension, greatly improved by appropriate diet and treatment, and a second time, six days after having been discharged in a much better condition, in a state of collapse which had set in after a violent diarrhœa, produced by an incongruous meal. In the course of this second period he suffered several times from suppression of urine, lasting from twenty-four to thirty-six hours. The patient ultimately recovered. The anuria,

in this case, was to be attributed to the collapse following alimentary poisoning and the intestinal storm. Its happy termination might be explained by the fact that, the whole life-rate of the boy being lowered, the excrementitious matters of the urine were formed in reduced quantity or their composition was modified so that no special poisonous effect on the system followed.

Bampton²_{Dec. 15, '94} relates a case of complete anuria, in a man aged 64, lasting ten days, without convulsions and without any obstruction in the urinary passages. The post-mortem examination showed granular kidney only. Bampton discusses three theories to account for the suppression: (1) "choked filter," from accumulation of excrementitious bodies; (2) paralysis of renal epithelium, from an alkaloid poison; (3) stop-cock action of the renal artery, from irritation produced by retained urinary constituents. He considers that potassium salts are the probable poisons mainly concerned. In the case described by Rininger²⁰²_{Sept. 10, '95} suppression of urine came on without any noticeable symptom, in a young girl aged 18, and lasted for forty-eight days despite the different treatments employed. Finally it was overcome by the use of the electrical current and strychnine. The author supposed that it was due to urinary congestion, but the cause of this remained undiscoverable. John Oakley²⁶_{Jan. 1, '95} has observed three cases of suppression of urine due to the presence of calculi in the ureters, as shown by operation in two of them and by the characters of the urine in the other.

In the case related by Ochevsky¹⁴_{May 22, '95} suppression of urine lasting for three days, and due to contraction of the sphincters following a chronic malarial infection, completely disappeared after a subcutaneous injection of 7 drops of Fowler's solution, followed by another injection of 1 gramme (15 grains) of quinine sulphate. A week later suppression recurred and was again overcome by this treatment. A full recovery ensued. The author admitted as a cause of the trouble a neurosis of central origin and of malarial nature, this opinion being favored by the absence of any previous vesical lesion and of any change in the urine, the existing malarial infection, and the curative action of quinine.

Pollakiuria and Polyuria.

According to Svensjon,²¹²_{p. 117, '95} there are four different kinds of pollakiuria. The first purely neuropathic, affecting neurasthenic people, but in the majority of cases there exists some material cause, as an exaggerated sensitiveness of the urethra, especially of its membranous portion. The main cause is frequently but a spontaneous retention of urine. The diagnosis is easily made in these cases by means of exclusion; if the patient does not suffer

from tuberculosis, urethritis, chronic nephritis, diabetes, etc., and if the capacity of the bladder is not essentially diminished the diagnosis may be firmly established. For the treatment, those means which fortify the organism as a whole are much more important than topical measures. The second kind of pollakiuria, often accompanied by polyuria in men more than 50 years old, is ordinarily a symptom of senile dysuria, with residual urine, congestion of the bladder and kidneys, and, in the second stage, with nocturnal incontinence. This form seems to be radically cured by regular catheterism. A third kind of pollakiuria is due to urethral stenosis so slight in degree as not to be accompanied by the ordinary symptoms of stenosis. It is, however, easily discovered by the use of an olive sound (No. 17 or larger). Treatment consists in mechanical dilatation or internal urethrotomy with three or four incisions at some distance from each other. A fourth class of pollakiuria may depend upon various pathological lesions of the uro-genital system, such as chronic prostatitis.

Marinesco¹⁴_{p. 81, '95}; ⁶_{Feb. 9, '95} details the history of two boys (brothers) affected with this disease. Their mother suffered from the same ailment, but in a slighter degree, during her pregnancies. The quantity of urine passed by each of the brothers averaged no less than twenty-eight litres (quarts) a day. Analysis of the secretion revealed nothing abnormal beyond an excess of chlorides. One of the children having succumbed to cerebral meningitis, an opportunity was offered for a detailed examination of the nerve-centres. The fourth ventricle presented to the naked eye an œdematous or, rather, gelatinous appearance. Histologically no alteration was discovered in the nuclei of the vagi, but the walls of the fourth ventricle were the seat of small hæmorrhages outside the vagi nuclei, and the neuroglia was considerably hypertrophied. The delicate fibrillæ of the ventricular walls had, moreover, disappeared.

Jules Janet³¹_{Feb. 23, '95} advises the treatment of frequent micturition of nervous origin by progressive dilatation of the bladder. This operation consists in filling the bladder with boric water and noting the manometrical risings taking place under the influence of vesical contractions and filling the bladder to the utmost several times at a sitting. Many patients have experienced a lessening of the pollakiuria after such dilatation.

Hæmoglobinuria.

Hayem¹⁰⁰_{Aug. 13, '95} relates a case of paroxysmal hæmoglobinuria in which the attacks followed the action of cold and were sometimes accompanied by fever.

Bishop⁵⁹_{Mar. 9, '96} reported to the New York County Medical Association a case in which the urine, on certain occasions, contained blood-pigment, but which, upon careful and repeated examination, had not been found to contain blood. The patient was a sailor, and had begun to pass colored urine from the time of great exposure on ship-board. He could bring on an attack at will by exposing himself to cold, and it was only after such exposure that the urine was colored.

L. Faugères Bishop⁹_{May 16, '96} describes a case of paroxysmal hæmoglobinuria due to cold and occurring, therefore, only in winter. The case was peculiar in that, in summer, when the patient was free from the ordinary attacks of hæmoglobinuria, he was troubled by cerebral symptoms in the shape of disturbances of sleep, fright, hallucinations, etc. His sufferings were great, and could not be influenced by medication.

Chauffard¹⁴_{June 16, '96} relates a case of paroxysmal hæmoglobinuria from cold. Ehrlich's experiment was tried and the serum found to be a pinkish cherry color in the arm ligatured and exposed to iced water, and yellow in the other, simply exposed to the air. The clot did not redissolve in either case, as it should do in an attack of hæmoglobinuria. This is explained by supposing that a central nervous disturbance is required, in addition to exposure to cold, for the production of a typical attack. The relation to the nervous system was shown by this case, for the exposure of the hand isolated by ligature to intense cold produced all the prodromal symptoms and premonitory albuminuria of a general attack.

The mode of action and the path taken by the nervous reflex is uncertain, but that some nervous reflex is the starting-point of the chemical process which results in an attack of hæmoglobinuria seems clear.

Courtois-Suffit⁸¹_{Mar. 2, '96} has observed a case of essential paroxysmal hæmoglobinuria in a child of 5 years, whose father had died from a syphilitic general paralysis, whose mother had had several abortions, and who himself showed undoubted signs of inherited syphilitic infection. Specific treatment with potassium iodide and mercurial inunctions led to the disappearance of the hæmoglobinuria and to an improvement of the syphilitic lesion. From this case the author draws the inference that, in every instance of hæmoglobinuria so-called essential occurring in a child, the specific treatment should be employed even in the absence of any sign of hereditary syphilis.

Comby⁹⁹⁶_{July 10, '96} relates four cases of paroxysmal hæmoglobinuria *à frigore* in children aged, respectively, 9, 7½, 8½, and 8 years.

In three of them the cause of the hæmoglobinuria was evidently hereditary syphilis.

Armand Siredey and Garnier¹⁴_{June 9, '96} related to the Société Médicale des Hôpitaux of Paris the case of a woman, 37 years old, who suffered from paroxysmal hæmoglobinuria, occurring under different influences and sometimes even without any apparent cause. Ehrlich's experiment, during the interval between the attacks, was tried, and blood was examined from the two hands (the one exposed to the air and the other plunged in iced water half an hour, the ring finger being tightly ligatured at the base). The blood of both hands had, the next day, the same appearance. There was no clot, this having seemingly redissolved in the serum, which had an intense pinkish color and, examined under the spectroscope, showed the characteristic stripes of oxyhæmoglobin and methæmoglobin. The experiment was repeated, and the blood at first coagulated rapidly; the serum, very strongly colored a red cherry in its inferior part near to the clot, was tinged a clearer rose in the superior layers, becoming yellowish at the surface. Four hours later the color was almost the same on the whole height of the serum, and the clot had already redissolved, leaving at the bottom only some little lumps, soft and friable. The appearance of the serum drawn during the access was identical with that of the blood outside of the attacks, thus demonstrating the dissolution of the hæmoglobin during and after these latter. The question still remains unsolved whether any subordinate relation exists between the cherry-red coloration of the serum and the dissolution of the clot shortly after its formation.

A review of the current opinions upon paroxysmal and non-paroxysmal hæmoglobinuria is given by Bécart,²¹²_{Sept. 25, '96} who insists especially on the relation of the continuous form with Bright's disease, recalling the pre-nephritic and post-nephritic varieties admitted by Robin.

Tomaselli²_{Sept. 14, '96} describes a class of cases found in the subjects of chronic malaria in which the administration of quinine is followed by symptoms resembling paroxysmal hæmoglobinuria. The method of administration and the quantity of the drug used seem to have no influence in relation to this curious idiosyncrasy, which appears to be more or less transmissible, since several members of the same family showed the same intolerance of the drug. In cases of this kind quinine must be entirely proscribed. As a substitute, the author uses salicin and Fowler's solution or alcoholic extract of eucalyptus.

Kanellis⁶⁷_{Jan. 30, '96} relates a case of hæmoglobinuria due to quinine, and which was followed by an acute, albuminous nephritis.

Hæmaturia.

Broca ¹¹⁵³_{Jan. 5, '95} describes the case of a woman, 28 years of age, who, after delivery, had been seized by hæmaturia, with pains in the right lumbar region and hypochondrium. The hæmorrhages had never ceased, seeming rather to increase without, however, disturbing the general health. Their renal origin having been established, an exploratory operation was performed; but, nothing abnormal having been found in the kidney, it was thought not advisable to remove the organ and the wound was sutured. The first urination after the operation was bloody, but it was the last of this kind, the urine becoming perfectly normal after that. In reviewing the similar observations published, Broca comes to the conclusion that such cases are probably to be considered as renal hæmaturic neuralgias, and that an exploratory operation may, in certain conditions, prove curative.

Hæmatoporphyrinuria.

R. Oswald ⁴³_{Jan., '95} gives notes of a case of hæmatoporphyrinuria following the administration of sulphonal. Stokvis, of Amsterdam, ³¹_{Aug. 31, '95} has studied the question of hæmatoporphyrinuria with the aim of determining if transformation of blood-pigment into hæmatoporphyrin take place in the blood or in another point of the organism, and comes to the conclusion that hæmatoporphyrinuria, normal or pathological, is, before all, connected with the introduction of hæmoglobin with food. In hæmatoporphyrinuria consequent on sulphonal poisoning, lead colic, etc., it is due to the gastro-intestinal hæmorrhages provoked by the action of these poisons. The effused blood undergoes a peculiar metamorphosis resulting in the production of hæmatoporphyrin, which is absorbed and excreted through the kidneys.

DISEASES OF THE SUPRARENAL CAPSULES.

From his studies on the functions of the suprarenal gland A. G. Aulde ²_{Oct. 6, '94} is led to conclude that, in its medulla at least, a substance is elaborated which is transmitted to the blood, and which may be supposed to have a far-reaching effect on the composition of that fluid, imparting to it essential qualities that possibly enable it to neutralize and render inert poisonous substances,—a conclusion which the examination of the blood of the adrenal vein would seem to warrant. That this substance has also, directly or indirectly, the control of normal color, within certain limits, is likewise a legitimate conclusion; and, finally, its

arrest would, no doubt, form one of the principal etiological factors in Addison's disease, in which the blood clots with difficulty and the red corpuscles refuse to form *rouleaux*. Of the suprarenal gland it may be said—in the same manner as for the thyroid and pituitary glands in their connection, respectively, with the respiratory and nervous systems—that it is an appendage of the renal vascular system, being at the same time also in intimate connection with portions of the nervous system. Its functions, so far as the author's investigations indicate, are: (1) the destruction of certain effete products of metabolism which are of the nature of ptomaines, and (2) the elaboration of a secretion which is absolutely essential to the blood (hæmatopoietic). Its destruction is followed by an auto-intoxication and a profound alteration in the chemistry of the blood, which entails, among other effects, degenerative or nutritional changes in the nervous and digestive systems, and derangement of the color-regulating metabolism.

De Dominicis⁹⁹⁶_{Jan. 10, '95} has made a series of experiments in order to throw some light upon the functions of the suprarenal capsules. He concludes that total extirpation of these bodies, either simultaneously or with an interval between, invariably causes death after a maximum lapse of two, three, or four hours. This ablation immediately causes intense shock, with phenomena of stupefaction and of general collapse, especially of the heart. Previous section of the spinal cord or the exhibition of atropine notably retards these symptoms and, at the same time, diminishes their intensity. The theory of auto-intoxication appears to the author less in accord with these facts than with that of a violent neurolytic action, thus apparently confirming the recent opinions of Fusari, that the suprarenal glands are nervous ganglia.

Boinet,⁴⁶_{Jan. 1, '95} from the results obtained in many experiments on the suprarenal capsules, is led to dispute the opinion of de Dominicis, that total simultaneous suppression of both glands leads constantly and inevitably to the death of the animals in, at the most, two, three, or four hours. Simultaneous ligature of both capsules is more quickly fatal than double extirpation. Thyroid, splenic, and glandular hypertrophies were noted in cases where long survival occurred. During life no pigmentation was observed on the skin. The author agrees with Arnaud and Alezais, who have observed a systematic ascending degeneration, starting from the small juxta-capsular ganglia, reaching the great splanchnic and semilunar ganglia, and thence spreading to the lateral column of the cord.

J. Pal,³¹_{Nov. 14, '94} from his experiments on the influence of extirpation of suprarenal bodies upon the intestinal functions, is led to

confirm the opinion promulgated by Jacobi, that removal of these glands does not interfere adversely with the alimentary canal; neither are the glands so essential to life as formerly supposed. These experiments tend to dispel the older notion of the glands being the cause of the diarrhœa in Addison's disease, which was held to be due to a deranged function of the suprarenal bodies.

From his experimental researches Berdach ¹²⁶_{Apr. 16, '95} draws the following conclusions: The suprarenal bodies are not absolutely necessary to life, as is shown by the results of their extirpation, provided the neighboring nervous plexi are not injured. After total extirpation, as in uncomplicated affections of suprarenal bodies and neighboring nervous net-works, an abnormally lower temperature is often observed. This fact, as well as all the other manifestations of Addison's disease, cannot be attributed to a lesion of the adrenals, but rather to an affection of the sympathetic system.

The removal of one of the suprarenal capsules in a dog has given no positive results in the experiments of Lo Re. ⁵⁸⁹_{May 7, '95} The right suprarenal capsule, extirpated two weeks after the left, showed no signs of compensatory hypertrophy. No trace of suprarenal tissue was found at the post-mortem examination, and during life the animal had shown no signs of pigmentation of mucous membranes or any disturbance of the nervous system. Moreover, this and other similar experiments showed that dogs may live after removal of both suprarenals.

Zybouski ¹¹⁵³_{June 8, '95} has made a series of researches on the functions of the suprarenal bodies. Removal of but one gland is not followed by any remarkable change and the animal almost fully recovers. Removal of both glands is followed by death within twenty-four hours, ordinarily, the animal becoming apathetic, dyspnœic, with slackening of the pulse, lowering of the blood-pressure to 0, and stiffness of the muscles. If, to an animal showing all these symptoms, an intra-venous injection be made of 1 cubic centimetre (15½ minims) of aqueous extract of adrenals (10 per cent.), the above symptoms almost immediately disappear, to recur again after five to fifteen minutes; a new injection causes them again to disappear. The same injection made to a healthy animal, not deprived of its adrenals, was followed by heightening of the blood-pressure above normal, slackening of the pulse, and quickening of the respiration. It was possible to immunize the animals against the capsular extract by inoculating them first with minimal doses and afterward with gradually increasing doses of it. Experiments made with the urine of injected animals showed that the capsular extract was excreted through the

kidneys. Indeed, the urine of such animals, when injected into other ones, whether or not deprived of their adrenals, acted in the same manner as the true aqueous extract.

Abelous, ¹⁴_{June 19, '95} by experimenting on frogs, has ascertained the antitoxic power of suprarenal tissue toward atropine. The injection of 0.015 gramme ($\frac{1}{4}$ minim) of atropine sulphate into frogs in which both adrenals had been entirely destroyed gave rise to toxic accidents after some hours, while no evident troubles occurred in those in which one gland had been but partially destroyed. Frogs deprived of the liver and adrenals were seized with the symptoms earlier and more severely than those deprived only of the liver.

Gluzinsky, ¹²⁶_{July 15, '95} by means of intra-venous injections of the glycerinated extract of adrenals into frogs, guinea-pigs, and rabbits, has ascertained the highly poisonous action of this substance. It killed the rabbit at a dose of 0.30 gramme to 1 gramme ($4\frac{1}{2}$ to $15\frac{1}{2}$ minims), while the same dose of the extract of the kidney, pancreas, etc., remained without effect. Heating up to 100° C. (212° F.) does not diminish its toxicity. After intra-venous injection the rabbit showed paralysis of the legs, opisthotonos, convulsions in the anterior limbs, and dyspnœa. At the autopsy pulmonary œdema, hæmorrhages in the serous cavities, and the heart in diastole were found. Arterial pressure was heightened immediately after the intra-venous injection, but subsequently diminished. Subcutaneous injections of the same extract gave rise to less marked effects.

Weinberg ⁷_{Jan., Feb., '95} showed to the Société Anatomique of Paris the specimen of a case in which the suprarenal bodies were intimately connected with the kidneys and their substance at certain points directly continuous with that of these organs. Neither adrenals nor kidneys revealed, on microscopical examination, any alteration in their structure.

While studying the histological and histochemical changes of marasmus in infants Attlee ⁹⁰_{Aug., '95} noticed peculiar changes in the suprarenal capsules. In all cases of wasting, without exception, they contained a considerable amount of fat, while in many of them the liver showed no fatty change at all. This seems to suggest that the suprarenal capsules are among the first organs to be attacked by degenerative changes. Fatty changes of the suprarenal capsules are also found in children who have died from various diseases oftener than is generally assumed, but they are never so well marked as in marasmus, and, where wasting is a complication, they at once become pronounced. From observations on adults little is gathered, because in almost every case marked fatty changes are found. From the author's experimental researches

upon the same subject it would seem that starving produces marked fatty changes in the adrenals of young rabbits, though the liver at the same time may be unaffected, and that the capsules of adult rabbits, either starving or suppurating to a degree which implies marked cachexia, become intensely fatty. Unfortunately, the capsules are occasionally very fatty in normal adult rabbits.

Addison's Disease.

Rolleston ⁶_{Mar. 23, '95} dealt with this subject very fully in three lectures delivered before the Royal College of Physicians of London. After describing the special conformation of each gland and its relation to the surrounding structures and the histology of the gland, the author stated that it was to be regarded as a functional whole, the cortex and medulla doing the same work, but in unequal degrees. As to lesions, atrophy of the suprarenal capsules occurs normally in old age, but may occur earlier in life and cause Addison's disease. Hæmorrhage into the substance of the gland may be due to traumatism either late in life or in infants at birth. Fatty and lardaceous degenerations occur, and the glands have been found to contain cysts. Out of 131 cases in which death was due to tuberculosis, Rolleston found the glands tuberculous in 18, without, however, there being any signs of Addison's disease.

As regards the theories held as to the cause of Addison's disease, the author, after summing up the arguments in favor of each of them, stated that the theory of a lesion of the sympathetic system and that of suppression of an excretory function of the adrenals by means of which they remove effete blood-pigment and toxins from the circulation are untenable; more seemingly the function of the adrenals is a secretory one, the glands probably producing some fluid necessary to the economy and interference with this function giving rise to Addison's disease.

The observations of Schäfer and Oliver ¹⁵_{Sept., '95} on the physiology of the suprarenal bodies have thrown a new light on the nature of Addison's disease. These authors have shown that the suprarenal bodies elaborate a substance which has a very powerful action on the muscular tissues and more especially on the muscular coat of the arteries. It causes, in very small doses, an enormous heightening of the blood-pressure, dependent upon contraction of the peripheral vessels, due to a direct action of the substance on the muscular coat, and not to any action on the medullary vasomotor centre. It also acts directly on the heart, producing augmentation and acceleration, provided the vagi are divided. On the voluntary muscles its action is such that the period of contraction is

slightly and the period of relaxation greatly prolonged. On respiration more marked effects are obtained in rabbits than in dogs. The active principle of the suprarenal is only found in the medullary portion of the gland. Its activity is not destroyed by boiling, unless very prolonged, nor by dilute mineral acids or peptic digestion. Alkalies, on the other hand, diminish its potency. In cases of Addison's disease the authors failed to obtain any physiological action from the extract of the diseased capsules. It is thus clear that these glands have an internal secretion, and it is possible that the phenomena of Addison's disease are entirely or in part due to the absence of this active principle. The muscular and circulatory weakness would at any rate receive an explanation.

From the observations of Bedford Fenwick, Greenhow, Jurgens, Kalindero, and Babès²_{Mar. 30, Apr. 6, '95} it appears that the melanoderma of Addison's disease is to be observed whenever the periphery of the organ, the cortex, the nerve-filaments, or the ganglia of the region are involved. On the other hand, it is difficult to distinguish which phenomena are due to toxæmia.

Posselt³¹⁹_{Feb. 5, '95} reports 5 cases of Addison's disease which he had the opportunity of examining, first clinically and afterward post-mortem. In all of them the suprarenal capsules were found diseased. In 4 they were extremely tuberculous, 3 showing the disease on both sides and 1 on one side only. In the fifth case there was a carcinomatous degeneration of the left suprarenal as well as left-sided pulmonary cancer. The causes of the disease could not be ascertained in any of the cases. The most constant symptom was the steadily-increasing bronzing of the skin. In 2 cases there was a marked contrast between the extreme muscular debility and the well-nourished condition of the patients. The author inclines to the theory of Masino-Luco and Dutto, that Addison's disease is due to an auto-intoxication of the organism by neurin which the suprarenals have been unable to absorb.

Gioffredi and Zinno⁵⁸⁹_{Apr. 15, 16, '95} describe a case of Addison's disease in which the autopsy showed advanced fibrocaseous degeneration of the right suprarenal capsule and, in a less degree, of the left, while the semilunar ganglion, the nerves of the cœliac plexus, and the adjoining sympathetic, histologically examined, were found free from disease. As a working hypothesis, the authors suggest that, in cases of lesion of the sympathetic or other nerves without any capsular disease, the nervous disturbance may induce a functional alteration in the suprarenal capsule, so that it can no longer exercise its physiological function (whether that be the destruction of neurin or not). On the other hand, in cases where there is capsular lesion and yet no symptoms of Addison's disease, one

may suppose that enough healthy tissue is left in the capsules to carry on their function.

R. Marie¹¹⁵³_{July 24, '95} relates a case of subacute suprarenal cachexia without pigmentation. The patient had shown only two symptoms: (1) an uninterrupted rise of temperature during a month and a half; (2) a progressive cachexia marked by loss of flesh and inability to undergo any muscular strain. Death followed about two months from the beginning of the affection. On post-mortem examination only the adrenals were found diseased; they showed a caseous suppurative degeneration of tubercular origin. The mucous membranes did not show the smallest sign of pigmentation.

Cases of Addison's disease in which autopsy showed marked lesions of the adrenals (mostly fibrocaseous degeneration) are described by Donkin,⁶_{Feb. 2, '95} Crawford Aitken,⁶_{Apr. 13, '95} and Dyson.⁴⁵⁷_{July, '95} Donkin's case was remarkable for its rapid course, the first symptom appearing suddenly and death ensuing in less than three weeks.

The action of the extract or tincture of suprarenal capsules in the treatment of Addison's disease has been experimented upon in several cases. Maragliano,⁵⁸⁹_{Dec. 4, '94} Shoemaker,¹¹²_{Feb., '95} Lloyd Jones,²_{Aug. 24, '95} and Oliver,²_{Aug. 31, '95} refer to the good results of this treatment not only as a means of restoring muscular strength and improving the general condition, but sometimes as a true curative remedy. On the contrary, McCall Anderson,²¹³_{Feb., '95} expresses an unfavorable opinion on this treatment, denying its alleged curative properties and remarking that it might be of advantage in the earlier stages of the disease, when only the suprarenals are implicated; but that later on the neighboring nerves are involved,—the solar plexus and the splanchnics,—and treatment by extracts or tinctures of the adrenals cannot overtake the results of nervous changes, which to a large extent lead to the death of the patient.

In the case related by Chiporovitch,¹⁴_{July 21, '95} the symptoms of Addison's disease were well marked in a man, aged 60 years, who had had syphilis twenty years before. Specific treatment was carried out, and with such good results that the patient was, at the date of the communication, to be considered as approaching full recovery. The author, therefore, insists upon syphilis being searched for in all cases where a tubercular origin is not surely demonstrable, and mentions the observations of Birch-Hirschfeld and Andrew, in which syphilitic lesions of the suprarenal capsules had given rise to the symptoms of Addison's disease.

Miscellaneous Disorders of the Suprarenal Capsules.

Tumors.—Among neoplasms which may affect the adrenals, —and are exceedingly rare, according to Roger Williams,⁶_{Apr. 6, '95}

owing to the fact that obsolete structures have but a very small tendency to take on the neoplastic process,—two cases of adenomata are related by Rolleston²_{Oct. 20, '94} and Kelynack,⁶_{Dec. 22, '95} one of a large hæmatic cyst by Floersheim and Ouvry,⁷_{Jan., Feb., '95} and one of sarcoma by A. Caillé.⁵¹_{Aug., '95} None of them had given rise to the symptoms of Addison's disease during life.

Tuberculosis.—Coleman⁵⁹_{Nov. 3, '94} has reported the case of a sailor, 36 years old, with marked constipation, who died without assignable cause three weeks after coming under observation. There was marked asthenia without apparent cause. At the post-mortem examination it was found that the both lungs were studded with tuberculous masses and infiltrations and with miliary tubercles, that the left adrenal body was caseous and the right contained one large calcareous mass with numerous smaller ones scattered through its substance. Tubercle bacilli were found in sections prepared from the glands.

URINALYSIS.

General Considerations.

Halliday²⁸⁴_{May, '95} details some observations on his own urine and the urine of other persons, and comes to the following deductions: The urine is always at its maximum of acidity in the morning before breakfast and during part of the forenoon. Generally there is a more or less gradual decline of acidity till the minimum is reached about an hour or so after dinner, when the urine is neutral. In nearly all cases, however, toward 4 or 5 o'clock in the afternoon there is a gradual rise of acidity, with more or less slight variations, a maximum being reached about midnight.

From the fact that the urine is never identical in the same individual, Girard⁹⁹⁶_{Apr. 25, '95} gives the following rules for collecting this liquid: 1. Urinate for the first time at a given hour,—for example, at 9 o'clock in the morning,—and throw away this urine, which has been in the bladder since the day before. 2. Keep all the urine excreted till 9 o'clock next morning; urinate for the last time at that hour, and add this to the preceding amounts. 3. Estimate the total volume and send, at least, one litre, or, still better, send the whole to be analyzed. In this way the analysis will be based on averages, and will, therefore, be more likely to give an exact estimate on the state of the urine.

Huguet⁶_{Dec. 1, '94} states that urine can be kept for an indefinite period if 2 cubic centimetres of the following solution be added to the contents of the vessel: Mercuric cyanide, 10 grammes ($2\frac{1}{2}$

drachms); water, 100 grammes ($3\frac{1}{4}$ fluidounces). The addition of this salt does not alter the acidity of the urine, nor does it invalidate the results of the analysis.

The following plan for obtaining, quickly and easily, a small quantity of clear urine from a cloudy specimen, in order to make the usual test for albumin, has proved to Faugères Bishop⁹⁹_{Apr. 25, '95} extremely easy and satisfactory: A small quantity of the cloudy urine is placed in a test-tube and the mouth of the tube firmly plugged with cotton. A second test-tube is placed with its mouth to the first. The position of the tubes is now reversed so that the one with the urine is bottom upward. The upper tube is now carefully and gently heated over the flame of a Bunsen burner or an alcohol-flame and the expansion of the air above the urine immediately forces it through the cotton plug, and the filtered urine collects in the lower tube.

The following method of preserving urinary sediments is described by Fischel⁸⁸_{No. 12, '95} as superior to those which have been heretofore in use. After collection of the sediment by settling, or by means of the centrifugal machine, it is twice washed with distilled water to remove the urine as completely as possible. It is then covered by a mixture of equal parts of glycerin and distilled water to which about 2 per cent. of a saturated alcoholic solution of thymol has been added. All manner of urinary sediments are preserved in this way for ten weeks in their original size and shape. They may, furthermore, be stained before preservation by the aniline dyes or hæmatoxylin. Aside from its value to the teacher, such a method is of value to the clinician, in that it enables him to make a comparison of the urinary exudate from time to time during the course of a nephritis, and thus to form a better opinion as to the progress of the disease.

Leffmann¹¹⁹_{June 29, '95} finds chloroform the most satisfactory of the various agents suggested for preserving specimens of urine. About 6 or 8 drops are added to each fluidounce, and the mixture well shaken. The excess of chloroform soon collects at the bottom of the bottle. Samples so treated will keep for months, even in the hottest weather.

Bramwell²_{No. 1749, p. 8} makes the following suggestions for the study of urinary sediments: An ordinary conical urine-glass is filled with equal parts of urine and an aqueous solution of boric acid and set aside until the deposit settles. This is then removed by means of a pipette and transferred to an ordinary test-tube containing about $\frac{1}{2}$ drachm (2 grammes) of a solution of picrocarmin, and the two are thoroughly mixed and set aside for twenty-four hours. Some of the sediment is then removed, by means of a fine-mouthed

pipette, and mounted. If there be reason to suspect the existence of amyloid disease of the kidney a solution of methyl-violet may be used instead of picrocarmin. In order to bring out the fine details of the tube-casts stained in the manner described, and in order to preserve them as permanent preparations, they may be mounted in Farrant's solution, consisting of gum arabic and distilled water, each 4 parts, and glycerin, 2 parts, with a little camphor. A small test-tube is three-fourths filled with this solution and in it is placed, by means of a fine-mouthed pipette, the stained deposit from the test-tube containing the mixture of urine and solution of picrocarmin. The smaller tube is then securely corked, inverted two or three times in order to facilitate thorough mixture, and put aside until the sediment has had time to settle. In the course of three or four days a minute drop of the deposit is removed from the bottom of the tube by means of a fine-mouthed pipette, placed upon a slide, and covered. The preparation may, in the course of a few days, be sealed in the ordinary manner. If the preparation thus mounted is overstained with the solution of picrocarmin the deposit should be transferred to fresh Farrant's solution. Any organic deposit may, of course, be stained, mounted, and preserved in the same manner.

For the examination of urinary sediments Pollaci⁵⁸⁹_{No. 290, '94} employs the following method: The deposit left by urine in a glass is treated with Hayem's fixation-liquid (aqueæ destil., 200; sodium chloride, 1; sodium sulphate, 5; corrosive sublimate, 0.5), meanwhile shaking continuously the sediment. This is allowed to stand for twenty-four hours and then freed of Hayem's liquid and washed several times with distilled water. After that the sediment is fixed and its elements show their form and texture unaltered, exactly as if they were in fresh urine. An examination can be made of unstained specimens by mounting them in glycerin and inclosing the cover-glass with turpentine-mastic. If stained specimens are desired, a little of the sediment is left to dry on the cover-glass, then subjected for an hour to the action of a saturated aqueous solution of methyl-blue, and afterward washed, dried, and mounted in balsam; the hyaline, granular, and epithelial cylinders, as well as any other elements of the deposit, are thus recognized with the greatest readiness.

Elsner and Hawley¹_{Oct. 27, '94} conclude that the time gained by centrifugalizing urine is of great advantage in many cases where an unaltered urine is desired (fermentation not having taken place), such early precipitates showing the epithelial casts and other structures before changes in shape, size, and contour occur, without bacterial contamination. The centrifuge does not yield a pre-

precipitate in all urines, though in the majority of those in which no decided deposit takes place there is a haze or cloudiness near the bottom of the *éprouvette* which, with care, can be gained and which often gives a valuable microscopical picture. In some urines absolutely no precipitation or haze can be found. Centrifugalizing demonstrates, as no other method can, the insoluble and suspended elements present in abnormal urine; the presence of blood in the urine can also often be demonstrated by the aid of the centrifuge when the older methods fail to show it. In cases of transitory, cyclical, or permanent albuminuria, without marked subjective or objective symptoms, the centrifuge will often aid in establishing the underlying pathological condition; hence, for the insurance-examiner, the instrument becomes invaluable. No other method of urinary examination will be as likely to demonstrate primary genito-urinary tuberculosis. The repeated examination of suspected urine is necessary, as failures are frequent and tubercle bacilli are present in small numbers only. The centrifuge precipitates albumin with picric acid in from five to ten minutes, the test being equal in value to Esbach's, having the decided advantage over the latter (which requires fully twenty-four hours) that only a short time is needed, and that the mucin and other insoluble elements can be measured or weighed. The prompt bacteriological examination of serous exudates and other pathological fluids can be made by the aid of the centrifuge more thoroughly and with greater satisfaction than by any of the older methods, while occasionally tubercle bacilli can be found in sputum with the centrifuge which cannot be found without it. In 21 per cent. of the cases examined by the authors the centrifuge yielded results which led to more accurate diagnoses than could otherwise have been made.

Albuminuria.

Tests for Albumin.—The method of testing for albuminuria used by Philip Jaisohn⁵⁹ and claimed by him as being the most reliable and practicable is the following: Put a few drops of liquor potassic in a test-tube full of urine and filter it. Fill the test-tube one-half with the filtrate; then add 15 to 18 drops of fuming nitric acid. By this time the clear urine will be somewhat cloudy if it contain albumin. Boil it over an alcohol-lamp or Bunsen flame and let it stand for one-half hour. There will be a sediment of whitish flakes or brownish granules. Boil it again and observe whether or not these will dissolve. If they consist of albumin they will not dissolve on the second boiling.

In testing for albumin by means of Heller's nitric-acid test

Zeehuisen ⁴⁵_{May, '95} recommends the dilution of the urine so that its specific gravity is about 1005 in order that any chance of confusion arising from the rings produced by uric acid, resinous substances, etc., may be avoided. The same favorable results are obtained in the reduction tests for sugar and in Gmelin's and Jolles's barium tests for biliary coloring matter.

In a paper read to the Medical Society of Georgia, L. H. Jones, ⁶¹_{May 4, '95} after reviewing the progress in urinalysis, thanks to the rapid strides made in physiological chemistry, calls attention to the fact that much unnecessary confusion is brought about by speaking of the percentage of albumin found in a given specimen of urine. As a matter of fact, the actual weight percentage of albumin present never exceeds 3 to 4 per cent., and rarely 1 per cent., and yet it is common to hear of urines containing from 50 to 75 per cent. of albumin, reference being had to the bulk of the precipitate formed, usually with heat and nitric acid. This must necessarily depend much upon the time allowed for settling, and is wholly inaccurate and unscientific.

Ott ⁸¹⁴_{June 15, '95} knows of no reagent combining accuracy with ease and rapidity in determining the presence of albumin better than sulphosalicylic acid. This will at once show the presence of the smallest amount of albumin in the urine by causing a cloudiness when added to the urine. The sulphosalicylic acid may be added either in 30-per-cent. solution or in substance, as the crystals dissolve rapidly in the urine; the reagent can therefore be easily carried in the pocket. All that is necessary for an examination at the house of the patient is a test-tube and a bottle containing sulphosalicylic acid in substance, as the agent is hygroscopic. A glass-stoppered bottle is desirable. Devic ³¹_{Feb. 31, '95} likewise recommends sulphosalicylic acid as a practical and easy test for albumin, stating that its limit of sensitiveness is 1 to 20,000.

A 1 in 3 solution of resorcin is strongly recommended by Carrès ¹¹⁵³_{June 22, '95} as an infinitely more delicate test of the presence of albumin in urine than nitric acid. The materials necessary are only a test-tube, a little pipette of 2 cubic centimetres' capacity, and 1 gramme of resorcin. The resorcin is introduced into the test-tube and dissolved, with shaking, in 2 cubic centimetres of ordinary water. The urine (whatever may be its reaction) is then, by means of the pipette, allowed to gently flow on the surface of the solution, when, should albumin be present, a white ring is developed at the line of demarkation, no other coloration ever being observed. Alkaloids (unless, as is never the case in urine, they be present in very large quantities), urates, and urea do not yield the white ring with resorcin. Peptones, however,

when (as is rare) these are present in urine, give the ring, but the albuminous ring remains while the peptone ring disappears when the tube is plunged into hot water.

A method for separating sero-globulin from sero-albumin simultaneously contained in the urine has been found by Daiber.²¹⁴ The urine is poured into a vessel and mixed with an excess of absolute alcohol, which precipitates all the albuminous substances. This mixture is left to settle for some hours and then filtered and washed with lukewarm distilled water. Then the deposit, with the filtrating paper upon which it is collected, is placed in another vessel and distilled water at 30° C. (86° F.) is added, and, drop by drop, diluted acetic acid up to complete dissolution of the albuminoid substances. After filtration a solution of 1 part of sodium carbonate in 4 parts of distilled water is added, until the solution becomes perfectly neutral or slightly alkaline, and then a solution of ammonium sulphate 50 per cent., which precipitates the globulin under the shape of a flaky-white deposit. This latter may be dissolved in a solution of sodium chloride 1 per cent., from which it is again precipitated when the liquid is heated. The sero-globulin remaining in the ammonium-sulphate solution may be extracted in the shape of a precipitate by boiling the liquid. Thanks to this method, the author was able to detect the presence of the globulin apart from the serin in the urine of almost all patients affected with nephritis or cystitis, the amount of the first being often largely superior to the second. It follows, therefore, that globulinuria is not so rare as the defective method hitherto employed for the detection of globulin in albuminous urines led one to suppose.

Nucleo-albumin.—As a result of the examination of 205 urines (142 of men, 63 of women), Ott³¹⁹ May 26, '95 draws the following conclusions: 1. Nucleo-albumin exists, in variable amount, in every urine. 2. The reaction of the urine, whether acid or neutral, has no influence upon the demonstration of nucleo-albumin. 3. Nucleo-albumin, in febrile diseases, not so much in the initial period as in the ulterior course, undergoes an increase; while a diminution takes place in the stage of decline. 4. In cases of febrile albuminuria the increased excretion of nucleo-albumin precedes the albuminuria and persists somewhat after albuminuria sets in. 5. In cases of permanent albuminuria a moderate excretion of nucleo-albumin is not discoverable.

Sarzin,⁹⁹ Sept. 5, '96 working under the direction of Senator, examined two hundred urines for nucleo-albumin with a negative result. The urine of women was avoided, as the presence of vaginal secretions in such might be a source of error. The author does

not, however, deny the possibility of the occurrence of nucleo-albumin in the urine in rare cases,—for example, in cases in which there is extensive disintegration of the renal epithelium.

Globulin.—According to Boyd,⁹⁹_{Sept. 5, '95} the proportion in which globulin is usually associated with albumin in the urine varies so much that it is not possible to determine the variety of kidney disease by means of it. Even in amyloid degeneration the globulin may not be in excess. In the albuminuria of pregnancy it is present in larger amount than in other forms of albuminuria. In the albuminuria of heart disease the globulin is usually more abundant than in chronic interstitial nephritis. In acute nephritis without hæmaturia the two proteids are about equal, but when blood is present the globulin is proportionally more abundant. The author considers the presence of the proteid in the urine to be due to secretion rather than transudation, and inclines to believe that, the lower the state of nutrition of the renal epithelium, the greater the amount of globulin allowed to pass.

Peptonuria.—Senator⁵_{Aug., '95} finds that peptonuria occurs frequently or regularly in certain diseases, as croupous pneumonia, just before or after the crisis, in purulent meningitis, or peritonitis and empyema. It is much less frequent in articular rheumatism, and has not been found in leukæmia. The diseases in which peptonuria occurs are usually not difficult to recognize; so that its demonstration is not very important. This statement, however, is not true of meningitis, and, according to Senator, when peptonuria is present along with the other symptoms, that disease may be diagnosticated. In confirmation of the work of von Noorden and Stadelmann it was found that the peptone in these cases was not Kühne's peptone, but albumose. This seemed in some cases to be protalbumose, but the reactions were not absolutely certain.

Glycosuria.

Pansini⁴_{Dec. 3, '94} has studied polarization of saccharine urine in two hundred and thirty cases. Urine containing albumin or sugar is lævogyrate in proportion to the amount of the abnormal ingredient. The greatest rotation to the right was obtained in a specimen from a case of icterus. Apart from diabetic and albuminous urine, the rotation has no constant relation to the elements contained, but the author thinks that by this method we can recognize minute quantities of albumin or sugar more readily than by chemical tests.

Chemical Tests for Sugar.—To demonstrate the absence of sugar from normal urine and to make a quantitative estimation when present, Sir George Johnson⁶_{Jan. 12, '95} has devised and used, with

the best result, a new and simple method, for which the following solutions are required: 1. Standard solution of ferric acetate equal in tint to that yielded by a solution of glucose containing 1 grain (0.065 gramme) per fluidounce (15½ grammes). This standard solution is prepared as follows:—

R Liquor ferri perchloridi fortior (P. B., sp. gr. 1.42),	1 dr.	(4 grms.)
Acidi acetici glacialis (P. B., sp. gr. 1.058),	4 drs.	(16 grms.)
Liquor ammoniæ (P. B., sp. gr. 0.959)	2 drs.	(8 grms.)
Aquam destillatam,	4 fld. ozs.	(120 grms.)

Mix first the iron and the acid; then add the ammonia and water up to 4 fluidounces (120 grammes).

2. Saturated solution of picric acid prepared by boiling the crystals in distilled water in the proportion of 6 grains to 1 fluidounce, and allowing the excess to crystallize out on cooling. 3. Liquor potassæ (P. B., specific gravity 1.058). The apparatus required are: (a) a tube about 12 inches in length, graduated into 100 cubic centimetres, with longer divisions at each 10 cubic centimetres, accurately stoppered and lipped; (b) a tube half the above length and of equal diameter, accurately stoppered to hold the standard solution; (c) a boiling-tube 10 inches long, $\frac{3}{4}$ inch in diameter (internal), lipped, and graduated up to 4 fluidrachms; (d) one drachm-measure. The method of performing the analysis is as follows: Measure 1 fluidrachm of urine into the boiling-tube. Add 1 fluidrachm of the saturated picric-acid solution and $\frac{1}{2}$ fluidrachm of liquor potassæ. Make up to the 4-drachm mark on the tube with distilled or rain-water. Heat over a spirit- or gas-lamp and keep the liquid boiling for about a minute. Cool by dipping the tube, after a minute, in cold water, and ascertain that the cold liquid measures exactly 4 fluidrachms (16 cubic centimetres). If less, make up to the 4-drachm mark with distilled water; if more, evaporate down to the 4-drachm mark. If the color of the boiled liquid is the same as the ferric-acetate standard or paler, the urine is either free from sugar or contains less than 1 grain per fluidounce. If the color is darker than the standard, introduce it into the graduated tube until it stands at 10 divisions, while the stoppered tube at the side is filled with the ferric-acetate standard. Now dilute the dark-red liquid in the graduated tube with distilled or rain-water till the color is the same as that of the standard. Each division above 10 = 0.1 grain per fluidounce. Thus, 13 divisions = 1.3 grains, 30 divisions = 3 grains per fluidounce, etc. If more than 6 grains per fluidounce are indicated, dilute the urine ten times by pouring urine up to 10 divisions on the graduated tube and distilled or rain-water up to 100. Then analyze the diluted liquid as before. In this case each division on

the saccharometer indicates 1 grain of sugar per fluidounce. Thus, diluting from 10 up to 48 divisions shows that the urine contains 48 grains of sugar per fluidounce. If the urine, when ten times diluted, give a color paler than the standard, it contains less than 10 grains of sugar per fluidounce. Another portion should then be diluted five times by filling the graduated tube up to 10 divisions with urine, then up to 50 divisions with distilled or rain- water. The analysis is performed as before. The value of the divisions now will be half that with a ten-times diluted sample. Thus, 18 divisions would indicate 9 grains per fluidounce. If the urine has a specific gravity of 1035 or more, it should be at once diluted five or ten times before commencing an analysis. The percentage weight of sugar to the volume of urine may be ascertained by dividing the number of grains per fluidounce by 4.8. According to the author, no method is easier and simpler than this for detecting and estimating even small traces of sugar in the urine.

Upon the basis of a large series of examinations Jolles comes to the following conclusions ⁸¹⁴_{July 6, '96}: Glucose is not a normal constituent of the urine; a high specific gravity does not always indicate the presence of sugar, for not infrequently we see concentrated urines with a specific gravity of 1028 to 1032 which contain no sugar; small quantities of sugar influence the specific gravity but very little. With Trommer's and Worm-Mueller's test small quantities of sugar (0.08 per cent.) can be detected; often, however, the results are so confusing that an amount of sugar equal to 0.24 per cent. may be overlooked. Nylander's test is uncertain in urines containing less than 0.3 per cent. Out of two hundred specimens of sugar urine, in which comparative determinations were made by the means of the polarimeter and the quantitative estimation of Fehling-Wendrinier, in but sixty-six specimens did the results agree. Among the urinary constituents which influence the polarimetric method may be mentioned various medicaments. The limit of delicacy of the fermentation test is about 0.1 per cent.; below 0.1 per cent. this method is unreliable as a test for sugar in the urine. The phenylhydrazin test belongs to those sugar tests which give positive results in doubtful cases. The statement of Geyer, that this test also gives a crystalline precipitate in the majority of normal urines is certainly incorrect. The glycosazone crystals are very readily distinguished from the crystals of glycuronic-acid compounds by the aid of the microscope. In carrying out this test Jolles recommends that the test-tube, after boiling (about one hour) in the water-bath, be allowed to cool slowly and to stand for a long time (twelve to fourteen

hours). Hoppe-Seyler's test with alphanitro-phenylpropionic acid, which depends upon the formation of indigo, is not adapted as a single test for glycosuria. Its delicacy lies at about 0.4 per cent.

A. R. Elliott ^{July 27, '95} has devised and employed a method for the detection and estimation of sugar in the urine which, with great reliability, combines extreme delicacy and requires the employment of a minimum quantity of urine. The formulæ for its preparation and the details of its application are as follow:—

SOLUTION No. 1.

Cupric sulphate (C. P.),	. . . . .	27 grains.
Glycerin, pure,	. . . . .	3 drachms.
Distilled water,	. . . . .	2½ drachms.
Liquor potassæ,	. . . . .	ad 4 ounces.

Dissolve the cupric sulphate in the glycerin and distilled water. Gentle heat will facilitate the solution. When cold, add the liquor potassæ and mix thoroughly.

Solution No. 2 is a saturated solution of chemically-pure tartaric acid in distilled water. The solutions are quite stable and will keep indefinitely.

Into a test-tube pour a drachm of the cupric-oxide solution and gently boil over a spirit-flame. Then add 2 or 3 drops—no more—of the tartaric-acid solution and boil again. Now add the suspected urine slowly, drop by drop, boiling and shaking the test-solution between each drop until reduction takes place or until 8 drops of the urine have been added. If no change follow the addition of this amount of urine, sugar is not present. The end reaction is a yellowish, reddish, or sometimes greenish-gray deposit of suboxide, which is marked and unmistakable. If the solution be put aside for a few moments the reaction deepens.

For the quantitative estimation of sugar the method is applied as follows: Take 133 minims of the cupric-oxide solution in a narrow-necked glass flask and add thereto 6 drops of the tartaric-acid solution and 3 drachms of liquor ammoniæ (U. S. P.). Mix thoroughly and add enough distilled water to raise the total volume of the solution to 2 ounces. This amount of the solution represents in sugar value $\frac{1}{4}$ grain of grape-sugar,—that is, it is reduced and decolorized by exactly $\frac{1}{4}$ grain of sugar. Its application is conducted in the same manner as Pavy's and Purdy's methods. The urine is added to the boiling test-solution, drop by drop, until the color has entirely disappeared. The number of minims of urine necessary to produce this result is noted on the burette or minim pipette used, and 480—the number of minims in an ounce—is divided by the number of minims so required and the product divided by 4, which gives the number of grains

of sugar to the ounce. Instead of this process, the urine, before testing, may be diluted with 3 volumes of distilled water, and 480 divided by the number of minims required to decolorize the test will give the number of grains to the ounce of urine. Knowing the total amount of urine for the twenty-four hours, it is a simple matter to estimate the total excretion of sugar.

A. H. Allen ⁹⁹_{Sept. 5, '95} recommends the following procedure: 7 to 8 cubic centimetres of the urine are heated to boiling in a test-tube and 5 cubic centimetres of solution of copper sulphate, as used to make Fehling's solution, are added. This precipitates nearly all the uric acid, xanthin, hypoxanthin, phosphates, etc. When nearly cold, 1 to 2 cubic centimetres of a saturated solution of sodium acetate are added, which will render the precipitation complete. After filtering, 5 cubic centimetres of the usual alkaline tartaric solution are added, and the mixture boiled for fifteen to twenty seconds. In the presence of more than 0.25 per cent. of sugar separation of cuprous oxide occurs before the boiling-point is reached, but with smaller proportions precipitation takes place during the cooling of the solution, which becomes greenish, opaque, and suddenly deposits the oxide as a fine orange-yellow precipitate. The best quantitative test for traces of sugar is, however, the phenylhydrazin test.

Williamson ⁶_{Sept. 21, '95} draws attention to a very simple method of carrying out the latter test. A test-tube of ordinary size is filled for about half an inch with powdered hydrochlorate of phenylhydrazin; then powdered acetate of soda is added for another half-inch. The test-tube is next half-filled with urine and boiled over a spirit-lamp. By shaking the tube the salts soon dissolve, and after the liquid has reached the boiling-point the boiling is continued for about two minutes. The tube is then allowed to stand, and is finally examined. If sugar is present a yellowish deposit forms at the bottom of the tube, and on microscopical examination this deposit is seen to consist chiefly of beautiful needle-shaped crystals of a bright sulphur-yellow color. The test can be performed and the characteristic crystals easily obtained, even if the urine contain a large quantity of albumin, the crystals of phenylglucosazone being easily distinguished under the microscope from the amorphous granules of coagulated albumin. No crystals are obtained, according to the author, in normal urine. Besides the various forms of sugar, glycuronic acid and pentose form yellow crystals with phenylhydrazin, and also reduce Fehling's solution; but their occurrence in the urine, except as the result of the administration of some drug or in the slightest trace, is exceedingly rare. The great value of the phenylhydrazin test (simplified

method) is as a negative one. A urine which gives no reaction may be declared quite free from sugar for all practical purposes.

Créquy²¹²_{p.273,'96} has devised a very rapid method of estimating sugar in the urine. This method, which is only a modification of Duhomme's process, is carried out as follows: Take a test-tube having at its lower part a mark indicating 2 cubic centimetres of liquid, fill it with Fehling's solution till it reaches this mark, heat and keep the liquid boiling for a time; then add, drop by drop, the urine to be examined. From the number of drops required to accomplish the reduction of the liquor the amount of sugar is deduced, it being known, according to Duhomme's calculations, that 4 drops of urine reducing 2 cubic centimetres of Fehling's liquor indicate a quantity of 50 grammes of sugar, 8 drops equal 25 grammes, etc. The author does not claim to insure by this method an exact estimation, but only an easy means for appreciating the influence of diet upon the amount of sugar in the urine.

Alimentary Glycosuria.—Brunelle²_{Jan.2,'96} points out that the presence of modified pigments in the urine, a subicteric tint in the conjunctiva, and a diminished amount of excreted urea show that the liver is implicated in the course of lead colic (hepatic insufficiency). The author has found that, when 150 to 300 grammes ($4\frac{3}{4}$ to $9\frac{1}{2}$ ounces) of syrup were taken in the day, alimentary glycosuria was present in 11 out of 21 cases of lead colic. Alcohol, as the cause of the glycosuria, could be excluded. The quantity of sugar, always small, was greatest during the first two hours. As a rule, the glycosuria disappeared with the colic. This glycosuria is especially frequent in those who have worked long in lead. The author believes that the lead acts directly on the nutrition of the hepatic cell. The glycosuria is fleeting because the lesion to the cells is slight. That some patients with mild colic do not have alimentary glycosuria must depend on individual peculiarities. The glycosuria is frequently accompanied by urobilinuria.

A long series of researches has led von Jaksch⁵⁷_{Sept.16,'96} to conclude that alimentary glycosuria is a constant symptom of some functional neuroses, such as Charcot's grand hysteria and traumatic neuroses; in the latter affection it may also be of value in differential diagnosis from simulation. In phosphorous poisoning grape-sugar ordinarily does not appear in the urine; alimentary glycosuria was, however, demonstrable in four cases of this kind, and the degree of the inability to assimilate grape-sugar was in direct relation with the degree of degeneration of the hepatic parenchyma; so that in such cases the increase or diminution of glycosuria may have a bearing on the prognosis.

Sulphonah Glycosuria.—Lafon ¹⁴_{May 8, '96} relates the case of a patient who, in 1891, was excreting 183 grammes (6 ounces) of sugar in twenty-four hours. Glycosuria ceased after some months' treatment. This patient took medicinal doses of sulphonah during a period of two months, the daily amount being 0.75 to 1 gramme (12 to 15 grains). Frequent analyses of the urine were made, and after the administration of sulphonah began it was always possible, by boiling for a short time, to obtain a well-marked precipitate of a yellow color,—namely, oxide of copper,—which, in the absence of proper precautions, would have led to the erroneous conclusion that sugar was present. The same samples of urine, examined by the polari-saccharimeter with monochromatic light (yellow sodium flame), failed to give the deviation to the right, which is characteristic of diabetic sugar, and, indeed, gave the slightest appreciable deviation to the left. Twenty examinations yielded the same result,—viz., the presence of sugar, indicated by Fehling's test, but excluded by the polariscope. The reduction of Fehling's solution is not due, as a rule, to a product of transformation of sulphonah in the animal economy, for the addition of a medicinal dose of 1 gramme ($15\frac{1}{2}$ grains) per litre (quart) to urine absolutely free from sugar will produce exactly the same reduction.

Renal Casts.

Renal Casts without Albuminuria.—Kossler ⁴_{Apr. 15, '96} reports a number of cases showing renal casts in the urine without true albuminuria. By the help of the centrifugal apparatus this fact was demonstrated in 18 cases of chronic pulmonary tuberculosis, 2 cases of rheumatic endocarditis, 3 cases of infectious pulmonary disease, 1 case of typhoid fever, and 2 cases of phosphorous poisoning. In no case was there any clinical evidence of amyloidosis, nephritis, or circulatory disturbances. The characters of the casts were hyaline, granular, waxy, leucocytic cylinders, epithelial and blood-cylinders. In the majority of cases nucleo-albuminuria was also present. The epithelial cells of the kidney were in all stages of necrobiosis, as demonstrated after death. Kossler, as a result of these investigations, regards cylindruria and nucleo-albuminuria as a syndrome *sui generis* to be distinguished from cylindruria with true albuminuria.

Ludwig Bremer ⁸²_{June 29, '96} states that, in his experience and opinion, the presence or absence of albumin in the urine is not nearly of as much diagnostic and prognostic importance as the morphological evidence of kidney disease afforded by the presence or absence of casts. A person who has constantly, or from time to time, casts in the urine, even if they be only of the hyaline variety, must be

considered damaged and prone to contract and succumb to other diseases. Again, albuminuria without casts is of exceedingly rare occurrence, while the opposite condition—casts without albuminuria—is very frequently met with.

Clinical Value of Renal Casts. — A. E. Austin ⁴⁵¹_{Oct., '94} divides renal casts into three groups, in the first of which he places hyaline and blood-casts, which, if found alone, merely indicate the presence of some irritation and consequent hyperæmia of the kidney, but not of sufficient severity to produce a true tubulitis with consequent desquamation of the epithelium. Closely associated with the hyaline cast is the amyloid change of the kidney, due usually to suppuration and equally favorable in its outlook if the source of suppuration can be removed. In the second group he places the epithelial, granular (both brown and pale), and fibrinous, all of which indicate acute inflammation of the tubules of the kidney, but of different degrees of severity and different stages of progress. The epithelial casts indicate a very early mild stage of the process,—one of mere desquamation; while the renal cells appear—both as seen in the urine and in sections of the kidney in a state of acute nephritis—either absolutely normal or, perhaps, slightly cloudy, with nuclei somewhat obscure. The process may stop here or there may follow both brown and pale granular casts, showing a much more advanced stage of the inflammatory process, though still an acute one, as well as one of much greater severity. In the last group should be placed fatty casts, when numerous and persistent, and waxy casts, both of which indicate long-continued and essentially chronic inflammation of the kidney, while the latter especially indicate the near approach of a fatal termination. With this condition blood is almost invariably absent and epithelial cells, even in the fatty form, extremely infrequent, since the tubules have been stripped entirely of their epithelial elements. That peculiar combination of pale, granular, and hyaline casts of small calibre, free from fat, is usually indicative of a fibroid kidney, where the cell is lost not from inflammation *per se*, but by the constant narrowing of the calibre of the tubule, by which the cells are squeezed from their site and hence lose their nutrition, while fewer and fewer cells can be accommodated in their narrowed quarters; perhaps, also, from the fact that an analogous change is taking place in the arteries providing their blood-supply, causing them to die from lack of blood-supply. As a modification of the latter condition we may see numerous hyaline and granular casts, as well as fatty casts of very small diameter, which prove a combination of fibroid and fatty kidney or a diffuse nephritis. That we may find all of these casts

at the same time must, of course, be acknowledged; but this does not necessarily destroy the validity of the above classification, for it is well known that a nephritis is a progressive disease, and, while certain portions of the kidney may have undergone the most destructive processes, other portions will be found comparatively unharmed. Therefore, from those portions of the kidney that are but slightly affected we may expect to find casts significant of this condition, while from those parts whose functions are almost lost through advanced disease of their tubules we have the fatty and waxy casts indicative of that state. We have, further, those extremely broad casts, of any of the varieties mentioned, which are evidence of the implication of the pelvis of the kidney.

Cylindroids.—According to Purdy,³⁹_{May, '95} cylindroids, or bodies resembling casts, to which Thomas first drew attention, are not characteristic of kidney disease, but probably more often caused by irritation of the lower urinary tract which has, in a measure, extended to the kidneys. These bodies are also sometimes met with in the urine, and consist of urinary crystals or granular salts. Only those composed of urates and hæmatoidin have thus far been observed, and they are of little practical significance, being only found in the urine of infants or in cases of gout, renal congestion, etc.

Uricæmia.

Th. R. Offer²⁶⁵_{v.8, '95} has observed that uric acid in alkaline solution gives, with phospho-molybdic acid and potash, a crystalline precipitate (hexagonal prisms) of a deep-blue color and of metallic splendor. The crystals are dissolved by hydrochloric and sulphuric acids, giving a blue liquid. This reaction is highly sensitive and might be taken advantage of in microchemical researches. Unhappily, albuminoid matters (as well as alkaloids and tannic acid) yield the same reaction.

Archibald E. Garrod⁴⁵¹_{Jan., '95} states that uric-acid crystals are normally colored by the yellow pigment urochrome and the reddish coloring matter uroerythrin, and not by urobilin or hæmatoporphyrin. The shades of color so frequently seen in uric-acid crystals represent varying proportions of the above two pigments. The brown appearance of the crystals produced by the action of mineral acids, the oxidation products of phenol derivatives, and the pigments of the bile have a share in the coloration of the crystals in some cases.

By employing Ehrlich's triacid mixture, to which methyl-green in excess was added, Neusser³¹⁹_{Jan.5, '95} has found, in the blood of patients suffering from gout and allied disorders (uratic calculi, asthma,

certain dermatoses, neuralgias, etc.), all of which are by him comprised under the name of uratic diathesis, certain peculiar black-stained granules disposed around the nuclei, mostly in large and small mononuclear leucocytes and sometimes also in polynuclear and eosinophile cells. These granules are not artificially produced, and are neither fatty granulations nor fragments directly derived from cellular nuclei. They are probably to be considered as bodies issuing from the nuclei, but chemically differing from them, perhaps a kind of nucleo-albumin,—one of the products representing the first stages of uric acid (if Horbaczewski's theory be admitted, that uric acid is derived from nuclein destruction). Neusser has never found such granules in the leucocytes of patients affected with tuberculosis. This explains the antagonism chemically observed between gout and tuberculosis, and the special course, marked by fibroid tendency, of the latter disease when it attacks gouty patients.

In order to prove the exactness of Horbaczewski's theory, that uric acid is a product of destruction of leucocytes, Richter ⁸⁴_{Feb. 28, '95} has estimated in several infectious diseases the excretion of uric-acid and nitrogen and the number of leucocytes, and has never found such a remarkable proportion as would appear according to Horbaczewski's theory; nor could a similar relation be demonstrated in cases of multiple sarcomata, of gastric cancer, and of severe anæmia. Only in leukæmia could a corresponding increase in uric-acid excretion be made out. The author thinks, therefore, that Horbaczewski's theory does not hold good in all cases.

In examining the fæces of a case of leukæmia Weintraud ⁸¹⁹_{May 4, '95} found xanthin bases in very large amounts,—in fact, ten times the quantity excreted normally by the urine. Smaller quantities were constantly found in the fæces of healthy persons and of those suffering from various diseases; so that the author claims that xanthin bases are normal constituents of fæces. That they are not already formed from food or from nucleus in the food the author demonstrated by feeding large quantities of food rich in nuclein (thymus), finding that the latter was absorbed and—an important fact—that the excretion of uric acid was enormously increased. It was also found that even after absolute milk diet—in which xanthin bases have not yet been found—the latter were, nevertheless, present in the fæces. Xanthin bases and uric acid were also found in the meconium of an infant with atresia ani. It would therefore appear that xanthin bases (hypoxanthin being the chief form) are excreted either from the wall of the intestine or the glands which pour their secretions into the intestine. Incidentally the observations demonstrate the absorbability of nucleins

in the intestine, the possibility of which has been denied by some authors.

Rosenfeld³¹⁹_{July 13, '95} proposes a new method for ascertaining the amount of uric acid passed undissolved. The patient passes urine into special filters, some four to ten of which may be used in the day. The amount of stone-forming uric acid is ascertained by estimating the uric acid remaining in the filters, the amount that separates out on standing, as well as the amount still in solution (by the silver method). The author tests the value of treatment by determining the effect of any given agent upon the three separate quantities of uric acid obtained in this way. He has thus found that both urea and carbonate of ammonium are valuable in preventing the formation of calculus.

According to Ott,⁸¹⁴_{Sept. 15, '95} the appearance of urates denotes an action on the part of the phosphates, while the crystalline urates or brick-dust deposits depend either on a total absence or a relatively insufficient quantity of disodic phosphate.

Haig²_{Dec. 8, '94} has made some further investigations on the direct introduction of uric acid into the body and its bearing on the prevention and treatment of disease. He states that in judging of the effects of uric acid its solubility in the blood must be taken into account. Such solubility is favored by everything that increases the alkalinity of the blood and hindered by everything that decreases its alkalinity; and uric acid accumulates because it is insoluble, while the soluble urea is practically excreted just as it is formed. At the present day much uric acid is often unnecessarily and thoughtlessly introduced into the body, and it may not only stay there, but at the time of its introduction it absolutely interferes with excretion of that which has been previously introduced or formed in the body. It follows from this that, whatever other dietetic treatment may be necessary for the prevention or cure of uric-acid disease, it is of the utmost importance never to introduce into the body a single grain of uric acid that can be left outside of it; for that grain of uric acid, if introduced, may not only remain and help to form a store in the body, but it may also prevent the excretion of that which is already in the body. In a further contribution²_{Mar. 23, '95} on the influence of diet and drugs upon uric-acid arthritis he concludes that drugs which clear the blood of uric acid may, if there is much of it in circulation when they begin to act, produce an arthritis, but if there is but little in circulation the signs of arthritis may be so slight as to escape notice. After the first attack of arthritis is over, and as long as the drugs keep the blood clear of uric acid, they will prevent rather than produce arthritis. Meat diet and

uric acid itself, regularly administered, act in the same way and may produce the same results.

Under the name of arthritic diathesis Cavazzani⁵⁸⁹ holds that two forms of disease are to be comprised having many points of analogy with each other: the arthritic diathesis, properly called (Flint's acidæmia), and oxaluria (Da Costa's lithæmia). The former, which the author considers as a distinct morbid entity, differs from gout in that it does not make its appearance under the shape of typical paroxysms, and affects persons suffering from changeable rheumatic pains which have their seat in the fascia and aponeuroses, in periarticular connective tissue, and in articular ligaments and nerves. This form in the author's cases never passed into true gout, nor were gouty manifestations traceable in the family history. The cause of such marked differences between otherwise kindred diseases is possibly to be searched for in certain chemical differences of the uric acid which collects in the system.

Paraxanthin and other uric-acid leucomaines are, according to Rachford,⁵⁹ the main factors of leucomaine poisoning, which is a very important phase of auto-intoxication, and which may manifest itself in at least three distinct, but closely allied, clinical forms, viz.: 1. As a true migraine or leucomaine headache. 2. As a migrainous epilepsy or leucomaine epilepsy. 3. As a migrainous gastric neurosis or leucomaine gastric neurosis. The author refers to some cases which support this view.

Acetonuria.

Salkowski⁸⁶⁸ calls attention to the fact that certain substances (sugars) yield the reactions usually characterizing acetone. He attributes this fact to decomposition of sugar and formation of acetaldehyde, and therefore recommends that in testing by the ordinary method, the urine be moderately acidified and distilled slowly and not too long.

In examining the relations existing between pathological acetonuria and azoturia in several diseases (diabetes mellitus, typhoid fever, pneumonia, phosphorous poisoning) Palma⁸⁶⁸ has found that acetone seems to increase, especially in those cases where destruction of albuminoid matters is also increased, whether they be of organic nature or belong to the albumin of alimentation. A direct proportion between the amounts of acetone and albumin has not been observed. A solution between the two is sometimes observed, but it is by no means constant.

Ernst Becker²⁰ has observed that in healthy subjects after narcosis acetonuria sets in, lasting from a few hours to several

days. This post-narcotic acetonuria indicates an increased destruction of albumin.

Malerba¹²⁶_{Apr. 25, '95} gives the following new test for acetone: A 5-per-cent. solution of dimethyl-paraphenylendiamine hydrochlorate— $\text{AzH}_2\text{C}_6\text{H}_4(\text{CH}_5)_2$ —is prepared and 5 to 10 drops of it added to the diluted solution of acetone. The violet color changes to rose and the next day to red. Under the spectroscope two stripes are seen analogous to those of hæmoglobin. The test is also good for uric acid, the solution of the latter being left to evaporate, and when the residue is fairly dried some drops of the above solution added, when a blue coloration is obtained.

Urea and Kreatinin.

Harvey Cook⁶¹_{Feb. 23, '95} succeeded in experimentally confirming Bouchard's views as to the non-toxicity of urea. After the injecting of 2 grammes of urea into the vein of a rabbit weighing 1.247 kilogrammes (that is, four times the amount formed in twenty-four hours) the animal showed neither stupor, somnolence, nor convulsions. By repeating the experiment he found that in order to kill 1 kilogramme ($2\frac{1}{2}$ pounds) of animal it was necessary to use 6 grammes ($1\frac{1}{2}$ drachms) of urea. According to this, it would take 360 grammes ($11\frac{1}{2}$ ounces) to poison a man of medium weight,—say, 60 kilogrammes (132 pounds), which is fifteen times more than he forms in twenty-four hours; therefore, in order that his death should be due to retention of urea, he would have to retain the entire amount of urea for fifteen days. These experiments show conclusively that urea, contrary to what is generally believed, is but feebly toxic. In double calculous obstruction uræmic (so called) accidents occur on the second or third day, but, according to the above observation, the person has formed at this time only one-eighth of the amount of urea necessary to cause death. The author states, however, that, although urea in itself is not a toxic body, the value of a quantitative estimation of it is not to be lost sight of; for, since this is the substance which forces the renal barrier, it necessarily follows that if the urea be diminished we must find other waste material diminished in proportion, thus making the quantity of urea a criterion, to a certain extent, of the toxic matter retained in the system.

Kolisch³⁴_{Mar. 19, '95} uses, as a test for kreatinin in the urine, a reagent containing sublimate, 30.0; acetate of sodium, 1.0; glacial acetic acid, 3.0; absolute alcohol, 125.0. The amount of kreatinin is ascertained by estimating the amount of nitrogen present. The following are, as known, the characteristics of kreatinin: (1) a color reaction with nitro-prusside and picric

acid; (2) power of reducing metallic oxides in alkaline solutions; (3) property of forming stable compounds with certain heavy metals.

Oechser de Coninck ¹²⁶_{Apr. 15, '96} states that, in order to detect kreatinin in the urine with nitro-prussiate of soda and soda (Burgundy-red coloration), the urine must be naturally acid or acidified with acetic acid and its quantity must be great (120 to 150 cubic centimetres—4 to 5 ounces). Some drops of diluted aqueous solution of soda are added and then some drops of soda-lye in such a proportion that earthy phosphates be not precipitated. If the Burgundy-red coloration is obtained with this test in an alkaline urine, it might be due to a substance other than kreatinin. Even, however, in an acid urine the reaction cannot be relied upon when pathological urines are concerned.

Pigments.

Urobilin.—Giarré ²_{June 15, '96} has tested for urobilin in 72 cases of infectious diseases, in 7 cases of hepatic lesions, in 16 newborn children, and in 10 infants under 12 months old. Urobilinuria was observed in a considerable quantity in measles (especially when broncho-pneumonia was present) and in scarlet fever; it was less marked in diphtheria. Its presence was proved in pneumonia and empyema. In typhoid fever it was out of proportion to the virulence and intensity of the infection. In cases of localized tuberculosis urobilinuria was not great, but in acute tuberculosis and tuberculous meningitis it was marked. It was present in 2 cases of angiocholitis. In hepatic disease with permanent biliary stasis it was present in quantity, whereas in cases of destruction of the liver-cells it was absent. In icterus neonatorum it was absent or slight. The author adheres to the theory that urobilin is a reduction product of bilirubin analogous to that brought about in the intestine by putrefactive processes, reduction being effected through the tissues. The author also concludes that urobilin is absent or present only in traces in the urine of children, that it is absent in newly-born or nursing infants, while it is not uncommon to find stercobilin in the fæces of infants artificially fed on milk. In the pneumonia of sucklings it is usually found without corresponding to the amount of stercobilin in the fæces. It is present in the majority of infectious diseases and is in relation to the increased hæmolysis.

For the estimation of urobilin in urine A. Studensky ⁹⁹_{Sept. 5, '96} recommends a process which consists in extracting the urobilin by means of chloroform, in the presence of copper sulphate and ammonium sulphate, and in the colorimetric comparison of the

colored chloroform solution of urobilin with standard solutions. If the urine to be examined be shaken with chloroform in the presence of copper sulphate the urine will not be entirely dissolved until after repeated shakings. If, however, after the addition of copper sulphate the urine be saturated with ammonium sulphate, which precipitates urobilin, the whole of the latter is at once taken up by the chloroform. Without copper sulphate only a portion of the urobilin is dissolved. The process is carried out in the following way: 20 cubic centimetres of urine are treated with a 1 to 10 solution of saturated copper-sulphate solution, then saturated with crystallized ammonium sulphate and 10 cubic centimetres of chloroform added. The mixture is shaken for some minutes and, as soon as a copper-red layer of chloroform solution has settled, a portion of it is removed by a separating funnel, placed in a test-tube, and compared with a standard solution of urobilin in chloroform. This solution is prepared by extracting a considerable amount of urine which contains much urobilin in the manner described, evaporating the chloroform solution to dryness, washing with ether, and weighing the residue. A series of solutions is then made up from this residue, and these may be preserved even as long as two months, if kept in the dark in closed vessels and covered by a layer of saturated solution of ammonium sulphate.

Urospectrin.—According to Saillet,³⁶⁵ normal urine contains a pigment which he has named *urospectrin*. Its solutions in ether and in alkalies give four absorption bands; acid solutions give two bands. It is similar to hæmatoporphyrin, but differs from it in some respects. It may be extracted as follows: The urine is shaken with acetic ether, which removes about two-ninths of the coloring matter. The residue left upon evaporation of the acetic-ether extract is soluble in ether. The ether extract contains the chromogen of urobilin and the new pigment. Upon exposure to light the urobilin chromogen is decomposed and the urobilin may be removed by shaking with water.

Hæmatoporphyrin.—Hæmatoporphyrin, which is sometimes excreted in large amount in the course of some diseases, has been shown to be sometimes present in normal urine. Garrod¹⁷⁸ gives the results of his observations on the urine of twenty normal individuals in good health. Both acid and alkaline extracts of hæmatoporphyrin were prepared and examined by the direct-vision spectroscope. The presence of the two absorption spectra under the different conditions (acid and alkaline) confirmed the presence of hæmatoporphyrin, which was found in every one of the twenty cases. Garrod concludes that this substance is present normally in urine, but that it is sometimes in such small quantity as to

escape detection. The method used by him is as follows: 20 cubic centimetres of a 10-per-cent. solution of sodium hydroxide are added to every 100 cubic centimetres of urine; the precipitated phosphates are collected and washed with water. The precipitate is dissolved in rectified spirit and acidified with hydrochloric acid; the solution shows the bands of acid hæmatoporphyrin. Ammonia is then added to precipitate the phosphates and acetic acid to redissolve them; chloroform then extracts the pigment completely and shows the bands of the alkaline pigments.

Indicanuria.

Gehlig ³⁶⁶_{v. 38, p. 225, '94} concludes, from a considerable number of observations upon children, both sick and well, that nurslings in good health or children fed upon sterilized milk, and not the subjects of digestive troubles, sometimes present a trace of indican in the urine. If digestive troubles occur, some indican is almost always found, its quantity varying with the gravity of the affection. In chronic catarrh of the intestine, cholera, and typhoid fever it is particularly marked. In older children, without digestive trouble, the urine normally contains indican. If the diet include a high proportion of nitrogenous food (eggs, meat), indican becomes more abundant. No relation exists between tuberculosis and a more or less marked indicanuria.

C. E. Simon, ⁵_{July, Aug., '95} after a careful review of the literature, summarizes the results of his experiments on the indican reaction of the urine by stating that a relation exists between indican and the acidity of the gastric juice, in the sense that a subnormal amount of free hydrochloric acid calls forth an increased degree of intestinal putrefaction, and, therefore, an increased formation of indol. Consequently, the elimination of indican in the urine may be regarded as an index of the amount of free hydrochloric acid present. Cases of ulcer of the stomach apparently form an exception to this rule, an increased indicanuria being usually associated with hyperchloridria. In cases in which the use of the gastric tube is impracticable or contra-indicated, or in cases of a mere superficial examination, the indican reaction will furnish a valuable index of the condition of the patient's digestive powers. By its aid we are enabled to follow very closely the results of treatment instituted in cases of gastro-intestinal disease. F. Villard ⁴⁶_{June 15, '95} has searched for the presence of indol and indican in diseased organs and has found them almost constantly in the liver affected with various lesions, much less frequently in the kidneys, spleen, lungs, and heart. The greater frequency of their presence in the liver is explained by the fact that this organ, being on the

route of the suprahepatic portal circulation, is one of the store-houses of the indol developed in the intestines. Richardson ⁹ June 22, '95 recommends the following test for indicanuria: Take equal quantities of urine and hydrochloric acid, add a few drops of a solution of hydrogen dioxide, and then chloroform as in Jaffe's test. Hydrogen dioxide possesses an advantage over sodium hypochlorite in that the reaction takes place more rapidly, the color is more distinct, and it is, therefore, better for approximate comparative quantitative analysis. The hydrogen dioxide also seems to oxidize the indican more completely, rendering it more reliable for quantitative analysis on evaporation of the chloroform and weighing the indican. Furthermore, this reagent introduces into the urine no substance likely to interfere with the test in the presence of albumins.

Pentosuria.

Salkowsky ⁴ Apr. 29, '95 has observed two new cases of what he calls pentosuria, the urine containing sugar, but not being fermented by yeast. He tests as follows to determine its presence in the urine: To 200 or 500 cubic centimetres ($6\frac{1}{2}$ or 16 fluidounces) of urine are added 5 to 12 grammes ($1\frac{1}{4}$ to $3\frac{1}{4}$ drachms) of phenylhydrazin previously dissolved in acetic acid. The mixture is heated to ebullition and then kept in a water-bath at the boiling-point for an hour or an hour and a half. It is then allowed to cool. If the urine contain pentose the liquid will be of a brown color, and on cooling a sediment of yellow needles will be formed. If it contain neither glucose nor pentose there will be only a brownish powder at the bottom of the vessel. The precipitate is dried, again dissolved by heat, and again crystallized. The melting-point of the crystals is then ascertained and must be 159° C. (318° F.). With Fehling's solution the urine presents a green and then a yellowish color, but reduction does not take place. Fermentation and the polarimetric test give negative results. The origin of pentose in the urine has not been ascertained, but, owing to its rarity, an alimentary origin is regarded as improbable. It seems possible that pentosuria may be due to an excessive formation of the nucleo-proteid found by Hammarsten in the pancreas and yielding pentose by separation, but it is also possible that pentose exists normally in the healthy organism, being destroyed by oxidation. Pentosuria would, therefore, simply mean a deficient organic oxidation,—a theory which appears to be the most plausible.

Scognamiglio ⁵⁰⁶ July, '95 has found pentose in urine sent to him to be tested for glucose. He employed the method of Salkowsky.

Blumenthal ⁴ July 1, '95 has likewise observed pentosuria in patients seemingly affected with diabetes.

Alkaptonuria.

H. Ogden ³¹⁹_{June 15, '95} has observed a case of typical alkaptonuria, the urine of the patient showing an abnormally low excretion of uric acid. The reductive power of the urine was not influenced by the aromatic series, nor by the administration of carbohydrates, but remarkably increased under an abundant meat diet. Stosse ⁸⁶⁸_{v. 4, No. 1, '95} found alkaptonuria in a patient operated upon for right pyonephrosis. He thinks that alkapton is a result of normal intestinal fermentation; in healthy individuals it is destroyed in the tissues, but when a delay or defect of nutrition sets in it escapes their destructive influence and is excreted with the urines in a quantity sufficient to allow of its being detected by chemical examination. H. Embden ⁹⁹_{Sept. 5, '95} has performed certain experiments with a view of testing the correctness of the hypothesis that homogentisic acid (alkapton) originates by an unusual form of metabolism from tyrosin. In a first experiment the acid in the urine was increased by a flesh diet; the administration of tyrosin doubled the excretion of the acid; phenylacetic and phenylamidoacetic acids had no such influence; oil of turpentine, kephir, and castor-oil, although lessening the combined sulphates of the urine, due to lessened putrefaction in the alimentary canal, had little or no influence on the amount of homogentisic acid. On administering the acid by the mouth, about 75 per cent. was excreted in the urine. Another point noted in the urine of this patient was an abnormally low excretion of uric acid. The second series of experiments, performed on healthy men and animals, showed that after the administration of the acid (by the mouth in man and by subcutaneous injections in dogs) the urine assumed all the characters of the urines of alkaptonuria, the amount of acid recovered in the urine being considerable, but, nevertheless, indicating that some had been destroyed in the living tissues.

Hydrothionuria.

Karplus ⁵⁰_{Oct. 20, '94} relates the case of a patient who, during convalescence from pneumonia, showed albuminuria, the urine, at the onset clear and free from smell, often becoming in a few hours very cloudy, developing a smell resembling that of sulphuretted hydrogen. Acid reaction remained unchanged. Some drops of this urine poured into other urine brought about a similar smell in the latter. It was thought, therefore, that the development of sulphuretted hydrogen was due to a micro-organism, and the author, in fact, succeeded in separating a bacterium endowed with this property, and whose starting-point was located in the urethra. It was a *typhus-similis* bacterium, but different from the micro-

organisms of this kind; likewise producing sulphuretted hydrogen, described by Müller, Holschevnikoff, and Rosenheim. The development of sulphuretted hydrogen under the influence of this bacterium did not occur at the expense of sulphates, but through the specific action of the bacterium upon the neutral sulphur of the urine; it ought not, therefore, to be classified with the germs of putrefaction which produce sulphuretted hydrogen through the reduction of sulphates.

R. Savor³¹⁷_{July 6, '96} describes the case of a pregnant primipara who was seized by several attacks of eclampsia, during which there was incontinence of feces with retention of urine. On the occasion of one of the last attacks the urine attracted attention by reason of its pronounced odor of sulphuretted hydrogen, and analysis demonstrated that the fluid was charged with that gas. It contained some hyaline casts, but no leucocytes or albumin. The reaction was acid. Some days after, while the proportion of sulphuretted hydrogen in the urine remained stationary, there escaped through the catheter a considerable quantity of gas having the characteristic odor of sulphuretted hydrogen. This phenomenon was repeated several times during the succeeding days, but shortly after gradually disappeared, the urine lost its peculiar odor, and symptoms of cystitis set in. The opalescent deposit of recent urine microscopically examined was seen to be formed by colonies of coli bacilli. The case, therefore, was one of bacteriuria without any clinical symptoms of inflammation of the urinary apparatus. The mode in which the bladder was infected was probably through the catheter, as there was incontinence of feces.

Special Reactions.

Lubiani⁵⁸⁹_{Sept. 21, '94} concludes that Rosenbach's Burgundy-red reaction depends essentially upon decomposition and oxidation, either direct, by means of nitric acid, or indirect, by means of some other mineral acid (hydrochloric, sulphuric) of the indol compounds, and eventually, also, though in a less degree, of the scatol compounds, or, more probably, of the phenol compounds, with formation of indigo red, of indigo blue, and of brown coloring matters as yet undetermined. The appearance of Rosenbach's reaction in the urine is always indicative of an abnormal process of intestinal putrefaction, and is of bad prognostic significance, especially when constant and continued in spite of medical or surgical measures.

Urine in Various Diseases.

Tetany.—Oddo and Sarles⁴⁶_{Oct. 1, '94} relate a case of tetany in which the urine did not contain any albumin, but contained indican,

which, as is known, originates in abnormal intestinal fermentation. The urine also contained an excessive quantity of phosphates, the proportion of the earthy to the acid phosphates being much in excess of the normal. The authors think that their own observations and those of Ewald on the toxicity of the urine and of the vomited matter in tetany point to the gastro-intestinal tract being the seat of origin of the disorder and that, therefore, treatment should be directed to this tract.

Arsenical Poisoning.—Hills, ⁹⁹_{Nov. 8, '04} from his observations on the urine in chronic arsenical poisoning, concludes that when the system has absorbed such an amount of arsenic that the quantity eliminated with the urine daily is relatively large (0.03 to 0.05 milligramme per litre) evidences of renal hyperæmia appear, sooner or later, and that the kidneys are not apparently, as a rule, susceptible to arsenic when the latter is present in the urine in quantities below 0.02 milligramme per litre.

Malaria.—According to Bottazzi and Pensuti, ¹²⁶_{Apr. 15, '05} the urine voided in malarial fevers during the attacks is less poisonous than that emitted during apyrexia, which, in its turn, is more poisonous than normal urines. Urinary toxicity increases in proportion as febrile accesses recur. As the symptoms provoked by its injection into rabbits do not differ from those produced by normal urine, it is not necessary to invoke a special toxin; suffice it to say that potash salts, phosphoric acid, pigments, and peptones are found in great amount in such urine. Febrile urines give rise to a slower poisoning, with sleep, increase of diuresis, diarrhœa, and mydriasis; apyretic urines cause more acute poisoning, sometimes fulminating, with clonic and tonic spasms, myosis, exophthalmos, and spasmodic expiration. It appears, therefore, that, in the case of the febrile urines, the polyuria and diarrhœa are due to the increase of urea and the sleep to the peptones; in apyretic urines the potash salts, the phosphoric acid, and the urobilin display a convulsivant action. It is in the progressive destruction of the blood and tissues that the explanation must be searched for of the progressive increase of urinary toxicity in the course of the disease.

Cancer.—Gandier and Hilt, ¹⁴_{Dec. 27, '04} have analyzed and estimated the toxicity of the urine of 17 cancerous patients (12 cancers of the breast, 3 of the uterus, 2 of the tongue), selecting only operable cases. The amount of urea was invariably less than normal (14 to 10 grammes— $3\frac{1}{2}$ to $2\frac{1}{2}$ drachms—against a normal average of 17 grammes— $4\frac{1}{4}$ drachms—in twenty-four hours); the toxicity of the urine, which did not exceed 0.45 in any other disease, reached 0.6, 0.8, 0.9 in cancerous patients. Whenever an oper-

ation was performed and patients recovered from it, the toxicity of the urine was found constantly diminished and the amount of urea increased; hence the urine after the operation had resumed its normal character. Griffiths, ^{June 2, 1895} describes a ptomaine extracted from the urine of cancerous patients. It is a white substance, crystallizes in needles, and dissolves in water with an alkaline reaction; it gives a brown reaction with Wessler's reagent. It is very poisonous and, injected into the veins, leads to fever and death in three hours. It is not present in normal urine. Duplay, Cazin, and Savoie, ^{360 July, '95} from researches on the urology of cancerous patients, arrive at the conclusion that hypoazoturia and hypophosphaturia are not, as Rommelaere holds, a constant characteristic of the urine in these cases. Hypoazoturia sets in only when patients are no longer able to take sufficient food. As long as feeding is insured by means of a proper diet, azoturia is normal and the average urea excreted daily by such patients is between 18 and 26 grammes ($4\frac{3}{4}$ and $6\frac{3}{4}$ drachms), the normal average being 18 to 20 grammes ($4\frac{3}{4}$ to 5 drachms). When, on the contrary, little or no feeding is possible, the daily amount of urea undergoes a marked diminution. Hypoazoturia should not, therefore, be considered as a symptom of cancerous disease, but only as one of the manifestations of the cancerous cachexia, when the patients can no longer feed themselves. Likewise hypophosphaturia is not constant in cancerous patients and, in the same manner as hypoazoturia, does not constitute an element of value in the diagnosis.

Detection of Chloroform in the Urine.

The best test for chloroform in urine is, according to Scal-fati, ^{589 Feb. 28, '95} to distill the urine to one-third its volume in a current of air previously freed from every trace of chlorine; boil the distillate with a pure alcoholic solution of potash, acidify with pure nitric acid, and then treat with a solution of nitrate of silver. In every case tested by the author a cloudiness occurred which disappeared on the addition of ammonia, and was therefore due to chloride. No similar reaction took place in the urine of those who were not chloroformed. The author estimates the chloroform quantitatively by means of the chloride formed when the distillate of urine is boiled with pure alcoholic potash.

DIABETES MELLITUS.

By R. LÉPINE, M.D.,

LYONS.

General Considerations on Sugar, Glycogen, and Glycogenesis.

Salkowski⁴_{Apr. 29, '05} states that, in order to test for pentose, it is necessary to take from 200 to 500 cubic centimetres ($6\frac{1}{2}$ to 16 fluidounces) of urine, and for each 100 cubic centimetres ($3\frac{1}{4}$ fluidounces) to add $2\frac{1}{2}$ grammes (39 grains) of phenylhydrazin dissolved in a quantity of acetic acid sufficient to render the solution acid. The mixture should then be heated in a Bohemian-glass vessel until it begins to boil, when the vessel should be placed in a water-bath for an hour and a quarter. When cooled the crystals of phenylpentosazone will be obtained. For diabetic urine it is best to first remove the glucose by fermentation and the alcohol by boiling, when the procedure above described can be carried out. Salkowski examined for pentose in nine cases of light and grave diabetes with negative results.

[This is readily explained by the fact that the procedure was imperfect.—R. L.]

Külz and Vogel³⁹¹_{B. 32, p. 185} found, in the urine of a certain number of diabetics treated by the phenylhydrazin test, a mixture of dextrosazone and pentosazone. They then treated the urine of 80 cases of diabetes by Tollen's reagent (which consists of heating the urine with a saturated solution of phloroglucin in hydrochloric acid), and in only 4 cases obtained a negative result; in 64 cases the reaction was positive, although not always very marked, and in the remaining 12 cases it was doubtful. The reaction is always positive and distinct in the urine of dogs rendered diabetic by the ablation of the pancreas or by the ingestion of phloridzin; it was finally positive, though varying in intensity, in the urine of a number of men and animals in the normal state. In the urine of diabetic dogs the authors, by the aid of phenylhydrazin, obtained a mixture of 6 grammes ($1\frac{1}{2}$ drachms) of crystals. This mixture was submitted to water at 60° C. (140° F.), which was sufficient to dissolve the pentosazone and not the glucosazone. By this method crystals were obtained sufficiently pure to have the requisite melting-point of 158° C. (316.4° F.), and also to contain the

requisite quantity of nitrogen,—17.07 per cent. The same authors also endeavored to isolate the pentose by fermentation of the urine to destroy the glucose; but they found that ordinary yeast destroyed the pentose,—a fact which explains the failure of Salkowski's experiments. They found the pentose in milk, tea, coffee, many wines, etc., which explains its presence in normal urine; but, on the other hand, their existence in the urine of the diabetic dog in a state of inanition shows that they may also be derived from the organism.

Külz and Vogel³⁶⁵_{No. 44, '94} have obtained from the liver of the ox osazones of maltose and isomaltose. It is therefore certain that the glycogen of the liver does not only produce glucose. Miura³⁹¹_{B. 32, p. 279} has repeated an experiment of E. Külz intended to fix the melting-point of phenylglucosazone, obtained by the action of phenylhydrazin on the blood of the ox (the albuminoids of which had been precipitated by alcohol). Like Külz, he found the melting-point to be between 204° and 205° C. (399.2° and 401° F.). It is thus certain that the sugar of the blood is glucose.

A. Jolles³¹⁹_{Nov. 3, 10, '94} examined one thousand specimens of normal and pathological urine, with the view of ascertaining whether traces of sugar must be looked upon always as pathological. Using the phenylhydrazin and the fermentation tests, as the most delicate tests for sugar, he found that 58 per cent. of the analyzed urine showed no trace of sugar, and he concludes that traces of sugar cannot be looked upon as normally present in the urine. This refers only to the examination of small quantities of urine, such as used for clinical examinations; if very large quantities of urine are used, even normal urines may show traces of dextrose.

The author again draws attention to the well-known fact of the absence of sugar in some urine with high specific gravity, where urates and free uric acid abound and where the reduction tests give positive results, and yet no sugar is contained in the urine; and, on the other hand, sugar may be found in urine of very low specific gravity. Thus, in a case of granular kidney, and with diabetes, the specific gravity of urine was only 1007 and contained 1.3 per cent. of sugar.

Of the tests which, in doubtful cases, prevent the possibility of a mistake, the phenylhydrazin test must be cited. The only drawback of the test is the formation of crystals similar to the phenylglucosazone crystals if glycuronic acid be present in the urine. To the author, however, the microscopical appearance of the two sets of crystals is sufficiently distinctive. The phenylglucosazone crystals occur in the form of bundles of long needles and of separate needles; the crystals of glycuronic acid appear in

the form of rosettes, the needles are thick and plump, and the whole resembles the crystals of ammonium urate. The delicacy of the test is interfered with in albuminous urines and in urines which are concentrated or rich in urates. The author has also submitted the test for sugar recently recommended by Hoppe-Seyler, and consisting in the formation of a blue color if urine is boiled with a $\frac{1}{2}$ -per-cent. solution of O-nitrophenylpropionic acid in caustic soda, to a series of experiments, but cannot recommend it as a very reliable method; however, if quantities of sugar over 0.4 per cent. are present, it may be used clinically.

Tangl and Vaughan Harley,<sup>246
B. 61</sup> in an experiment on dogs, tied the cœliac axis and the two mesenteric arteries. The animals lived from six to seven hours. Immediately after ligation and immediately before death the authors estimated the sugar in the blood, finding that it was, without exception, altogether minimum in the blood examined before death. Unfortunately they found, in four out of five dogs, a very feeble proportion of sugar in the first examined (only 0.4 to 0.5 per 1000).

[This throws a certain suspicion upon their method of estimating the sugar in the blood.—R. L.]

Pick<sup>273
B. 33, p. 305</sup> deprived the liver of glycogen by injecting into the ductus choledochus a weak solution of sulphuric acid. The inhalation of carbonic oxide leads to glycosuria only in animals from which all the glycogen has not disappeared; on the contrary, phloridzin diabetes appears to be even more intense, other things being equal, when the liver contains no more glycogen. As to the formation of glycuronic acid, and its synthesis with chloral to form urochloralic acid, it is not interfered with by the destruction of the liver. As regards the importance of the liver in the production of pancreatic diabetes, some experiments of Marcuse<sup>114
B. 26, p. 225, '04</sup> may be noted. This author has seen that the extirpation of the liver prevents the ablation of the pancreas to produce diabetes in the dog.

Butte<sup>927
Nov. 28, '94</sup> has repeated the experiments of Cl. Bernard, showing that glycogen disappears from the liver after section of the pneumogastriacs. Dastre<sup>927
Mar. 6, '95</sup> believes that glycogen does exist in the blood-corpuscles and not in plasma, where it would be destroyed by the diastasic ferment. Kaufmann believes, on the contrary, that the blood-plasma does not contain it, but he has not made rigorous experiments in this regard; and Bourquelot remarks that there exists in the blood albuminoid matters which may give birth to glucose. This author criticises the iodine reaction, which is not characteristic of glycogen, and recommends—to assure the existence of the latter—addition of a liquor of peroxide of hydro-

gen and filtration while warm. One thus has a precipitate of glycogen which can be saccharified by diastase.

Huppert^{B.18,p.144} states that staining by iodine is not characteristic of glycogen, as the myelin of the nerves gives exactly the same coloration and that other substances act in the same manner. The reaction of the leucocytes of pus—and sometimes those of the blood, but not always—is thus not characteristic. G. Salmon, in 1877, announced the presence of glycogen in the blood, being contradicted by Hoppe-Seyler. Huppert again takes up the question. He added small quantities (0.05 to 0.1 gramme— $\frac{7}{8}$ to $1\frac{3}{4}$ grains) of glycogen to several hundred cubic centimetres of oxalated or fluorated blood, and sought to determine how much could be found by means of the polarimeter, the rotatory power of the glycogen being fixed at 196.63. Brücke's method was found not applicable. Soluble starch, amyloextrin, and glycogen are precipitated in hydrochloric solution by phosphotungstic acid; but this method, as well as that of Landwehr, failed. There are three reasons for this disappearance of glycogen: first, that the diastasic ferment may saccharify it; second, that the albuminoid coagulum may retain it; and, finally, that sodium at 6.4 per 1000 in three hours at 100° C. (212° F.) causes a loss of 0.035 gramme ($\frac{1}{2}$ grain) of glycogen in a solution of 0.100 gramme ($1\frac{3}{4}$ grains) in 100 cubic centimetres ($3\frac{1}{4}$ fluidounces) of water. These three causes—the second of which is the principal—explain the failure of Nasse in 1866, Barfurth in 1885, and of Praussnitz in 1890 for blood, and of Naunyn in 1875 for pus. The author experimented on at least 200 cubic centimetres ($6\frac{1}{2}$ fluidounces) of blood for the dog, and from 2 to 3 kilogrammes (4 to 6 pints) for the ox. He describes the method employed,—consisting essentially of removing the greater part of the albuminoids by sulphate of copper, and the balance by Brücke's fluid after the copper had been removed by sulphide of ammonium. The plan is simpler for pus. Huppert and Czerny have thus obtained natural glycogen. According to them, glycogen is an element of the blood, apparently belonging to the leucocytes. Venesection does not increase the quantity of glycogen. The blood of the dog and of an animal fed on veal contains more than that of herbivorous animals. Histolysis (formation of abscess and persistent dyspnoea) causes the appearance in the leucocytes of a matter colorable by iodine and an increase of glycogen in the blood.

Seegen^{B.S.,p.405} confirms the fact that glycogen exists in a very small quantity in muscle tetanized, either directly or through the intermediary of the nerve. At the same time he measured the sugar in arterial and venous blood. In four out of five cases he

found the sugar of the latter in a notably smaller quantity. As to the diminution of glycogen in the muscle, it is in no way in proportion to the effort produced,—from which Seegen concludes that it is the sugar itself which is the most important source of the production of heat and effort.

In another article ²⁶⁵_{Oct. 20; Nov. 3, '94} the same author calls attention to the difference between arterial and venous blood as regards the amount of sugar contained in them, according as faradic excitation is brought to bear directly on the muscle or on the nerve. In the first case there is a notable loss of sugar in the muscular venous blood; in the second there is more sugar in the muscular venous blood than in the arterial blood. Seegen puts the question whether, in this case, a greater quantity of glycogen is transformed into sugar in such a way that the loss produced by effort is recompensed, and, more than that, by the production of a superabundance of sugar.

Noel Paton ³⁶_{Dec., '94} criticises the work of Pavy on the physiology of the carbohydrates (see ANNUAL for 1895), maintaining, in opposition to him, the doctrine of Cl. Bernard, that the liver forms sugar. As to his idea that the carbohydrates make up a part of the molecule of albumin, he does not consider it as proven; remarking that, as Bechterew shows, the sugars are not the only substances yielding a crystallized compound with phenylhydrazin. Paton also criticises the use of alcohol for the extraction of sugar; since, if the alcohol is strong, all the sugars are not extracted, especially maltose; and, on the other hand, if the alcohol contain a certain quantity of water, dextrin is also extracted.

Relative to the theory of Pavy that in diabetes there is weakening of the intestinal epithelium and of the liver, which both in the normal state prevent the entrance into the economy of a too great quantity of alimentary sugar, it does not explain most of the cases of this disease. When diabetes persists in spite of a pure animal diet, Pavy admits the separation of the molecule of albumin; but, as this molecule yields only 2 per cent. of carbohydrates, it is not a sufficient explanation of the glycosuria.

Glycosuria.

Georgiewski ³⁶⁵_{No. 27, '06} administered to dogs from 50 to 100 grammes ($1\frac{1}{2}$ to $3\frac{1}{4}$ ounces) of fresh thyroid gland almost daily, and injected into other dogs from 1 to 8 cubic centimetres ($\frac{1}{4}$ to 2 fluidrachms) of the fresh juice of the gland, obtained by hydraulic pressure. Almost all of the animals were affected with a disease characterized by tachycardia, a considerable emaciation, reaching 50 per cent. of their body-weight within a space of two months; poly-

phagia, polydipsia, temporary glycosuria (the urine sometimes containing as much as 17 per cent. of sugar), and no albuminuria. There was also an elevation of temperature of several tenths of a degree. All the symptoms improved and disappeared after the cessation of the gland treatment.

Ewald⁴¹_{No. 60, '04} observed the case of a woman cured of myxœdema by the ingestion of thyroid tablets, but presenting glycosuria. The suppression of the treatment caused the disappearance of the sugar from the urine.

C. Jacoby²⁷³_{B. 35, H. 2, 3; June, '95}⁹⁰ has succeeded in producing a marked polyuria with glycosuria in a series of experiments on animals by the administration of caffeine-sulphonic acid in doses of 0.1 to 0.3 gramme ($1\frac{3}{4}$ to $4\frac{1}{2}$ grains). The experiments were performed on rabbits, and in some cases the drug was administered subcutaneously or introduced by a sound into the stomach; but, as a rule, it was injected directly into a vein. In some rabbits, however, though the experiment was performed in the same manner, the diuretic action was very slight and there was no sugar in the urine. For this difference, at first, no cause could be found until it was noticed that the feeding of the animals was not the same. In the cases in which there was a marked diuresis the animals had been fed with roots (carrots and turnips), while in those cases in which the diuretic action had been slight the food had consisted chiefly of bran, bread, and hay. Also, when the animals were fed with roots, caffeine, and theobromine, as well as caffeine-sulphonic acid, it gave rise to diuresis and glycosuria. Further experiments showed that when the animals were fed with roots, benzoate of caffeine, and soda and also diuretin (theobromine and sodium salicylate), it gave rise to diuresis with glycosuria. Feeding with roots alone, without the administration of the drugs above mentioned, did not produce glycosuria.

The sugar-excretion stood in direct relation to the diuretic action of these drugs, and, if sufficient sugar were present in the blood, this was excreted in the urine, when, by the action of the diuretic, a considerable increase of the secretion of the kidneys was produced.

Phloridzin Glycosuria.—Lépine⁹²⁷_{Sept., '95} brings forward a new case in favor of the idea that phloridzin glycosuria is altogether distinct, pathogenically, from pancreatic diabetes. It is known (see Chauveau and Kaufmann, ANNUAL, 1894, F-82) that, if the spinal cord be severed in the lower portion of the cervical region or at the superior portion of the dorsal region and the pancreas then extirpated, glycosuria will be absent. Lépine cut the spinal cords of six dogs in the region above indicated and then administered

phloridzin. Glycosuria was produced just the same as if the cord had not been cut. This result is altogether in accord with the fact, formerly ascertained by him, that the glycolytic power of the blood is not diminished after the administration of phloridzin, while it is diminished after the extirpation of the pancreas.

Coolen,¹¹⁸⁴_{No.4,'94} after giving a very complete history of the physiological action of phloridzin, reports a number of experiments with it upon dogs, from which the following conclusions are drawn: Intense polyuria with azoturia in all the animals, reaching 100 per cent. in certain cases, and augmentation (though not constant) of the phosphoric acid and chlorides in the urine. Relative to the weight, the author makes the interesting remark that phloridzin glycosuria may be considerable without causing a notable loss of weight; and, on the other hand, that the loss of weight continues after the injections of phloridzin have been suspended. The same prolonged action is observed as regards the azoturia, phosphaturia, and chloruria.

The author insists, further, on the fact that, in view of the abundance of the polyuria, the percentage of urea, phosphates, and chlorides is always diminished in the urine, which proves that the polyuria may be attributed to a diuretic action of these substances upon the kidney. Another interesting result of his experiments is this: that the minimum dose producing glycosuria after intra-venous injection determines the same effect after injection into the portal vein, which proves that the liver has no inhibitory effect on the diabetic action of phloridzin.

Coolen has also seen that phloridzin has a much weaker action when ingested than when injected under the skin, which is explained by the influence of the walls (or the contents) of the digestive tube. If it be desired to produce phloridzin glycosuria in the rabbit, it is not only necessary to repeat the injections, but also to make the doses large. After extirpation of the kidneys, especially, there is severe hyperglycæmia (as much as 3.5 per cent.); and there may be observed in the rabbit, more readily than in the dog, a strong, severe glycosuria, persisting without diminution of weight.

R. A. Levene,¹⁷⁸_{Oct.15,'94} with the view of determining the part played by the kidneys in the production of phloridzin glycosuria, has performed a series of experiments on the action of phloridzin on dogs. Eight experiments were performed to estimate the effect produced upon the sugar of the blood by ligaturing the renal blood-vessels after administering phloridzin. In some cases there was a decrease of the sugar in the blood, but, from the profound changes produced by this operation, he thinks that great caution

is needed in drawing any conclusions. He next estimated the quantity of sugar in the blood of the renal artery and renal vein, after giving phloridzin in nine cases, and found in eight that no loss of sugar occurred in the blood in its passage through the kidney; in the other case the loss was slight.

To determine the amount of urine in the kidney itself, before and after the administration of phloridzin, Levene extirpated one kidney, then injected phloridzin, and on the next day determined the amount of sugar in the second kidney. In other animals he estimated the amount of sugar after the injection of phloridzin only. These experiments showed that after the injection of phloridzin the amount of sugar in the kidney may be very considerable, and that it is at least greater than in the normal kidney. Hence, the kidneys do not simply serve as a filter to eliminate the sugar; an active production of sugar in the kidneys is probable. Paschutin has shown that a tissue or organ may undergo carbohydrate degeneration after its nutrition has been disturbed. In order to determine whether the sugar is derived in phloridzin glycosuria by impoverishing the blood or whether more profound changes take place in the tissues, Levene undertook a number of blood-analyses. He found that in phloridzin glycosuria there was a constant decrease of the general amount of proteids and a varied relation between the serum-albumin and the serum-globulin, serum-albumin being usually decreased in quantity and serum-globulin increased. The ethereal extract containing fat, cholesterol, and lecithin is, in most cases, increased. As regards the sugar in the blood, the author found that it was frequently decreased; in some cases there was an increase, but the fluctuation in either direction was generally very slight.

There are two views as to the cause of phloridzin glycosuria: some observers think that it is the result of a simple elimination of sugar from the organism by the kidneys; others believe that an excessive formation of glucose occurs. The former base their view on the slight decrease of sugar in the blood after administration of the phloridzin and on the fact that after extirpation of the kidneys the quantity of sugar in the blood is somewhat increased in some cases; but no one has succeeded in establishing a fixed relation between the quantity of sugar in the blood and the sugar eliminated. Levene has also found a decrease of sugar in the blood in some cases, when the phloridzin was injected after ligation of the renal vessels. Again, Cornevin has shown that phloridzin greatly increases the quantity of sugar eliminated by the milk. Hence, phloridzin does not affect the kidneys alone. Further, Levene does not regard the extirpation of the kidneys as

decisive of the mode of origin of the glycosuria. As to the second view,—that there is an increased production of sugar, more especially by the kidneys,—he has shown that the venous blood of the kidneys, in phloridzin glycosuria, contains in some cases more sugar than the arterial, and the quantity of sugar in the kidney-tissue itself increases after the injection of phloridzin. The composition of the blood in phloridzin glycosuria testifies to the decomposition of proteids rather than to the mere elimination of sugar.

Manchot²⁰_{B.136,p.368} confirms his former communication (see the ANNUAL for 1894, F-75) as to the effects of chloralamid in doses of from 6 to 12 grammes ($1\frac{1}{2}$ to 3 drachms) per day in the frequent production of glycosuria, which may even be observed after a dose of 3 grammes ($\frac{3}{4}$ drachm). At the same time urochloallic acid appears in the urine (as after the administration of chloral), deviating to the left, and glucose, deviating to the right. If the examination be polarimetric only the sugar may be hidden by the deviation to the left. The glycosuria is usually of short duration. In one case, however, the author observed it to last for a period of six weeks.

Alimentary Glycosuria.—Von Jaksch⁸⁸_{June, '96} found alimentary glycosuria (1) in several cases of hysteria, its presence in certain cases permitting one to distinguish between the latter disease and simulation; (2) in acute poisoning by phosphorus, where he has seen the administration of 100 grammes ($3\frac{1}{4}$ ounces) of glucose give rise to the passage of 20 grammes (5 drachms) of sugar in the space of six hours (!); (3) in a case of icterus with hæmorrhagic diathesis and diminution in the size of the liver. Some days later, the liver having regained its normal size, alimentary glycosuria could no longer be produced.

Miura³⁹¹_{B.32,p.231} has made new researches on alimentary glycosuria. He took, one morning, 1200 grammes (38 ounces) of rice cooked in water (equal to 400 grammes— $12\frac{3}{4}$ ounces—of dry rice or 308 grammes— $9\frac{3}{4}$ ounces—of starch without water or salt), making 6.4 grammes of starch per kilogramme ($2\frac{1}{5}$ pounds). He experienced no consecutive glycosuria. Another day he took, at 9 A.M., 345 grammes (11 ounces) of glucose (equivalent to 302 grammes— $9\frac{1}{2}$ ounces—of glucose chemically pure and free from water and salt) dissolved in 480 grammes ($15\frac{1}{2}$ fluidounces) of water and 200 grammes ($6\frac{1}{2}$ ounces) of coffee. At 10 A.M. he passed 60 grammes ($1\frac{3}{4}$ fluidounces) of urine containing 8.4 per cent. of sugar, and at 11 A.M. 265 grammes ($8\frac{1}{2}$ fluidounces) containing 1 gramme ($15\frac{1}{2}$ grains) of sugar per hundred. The urine passed at noon contained only traces of sugar. It is to be noted, also, that the saliva

obtained from the parotid by catheterization at 10 o'clock and 1 o'clock gave the sugar-reaction with Fehling's solution. In all he eliminated by the urine and the saliva 0.77 per cent. of sugar, which makes 0.255 per cent. of the sugar ingested. Another healthy individual took 430 grammes (14 ounces) of pure glucose in five doses from 9 A.M. to noon, and at 4.30 P.M. the elimination had terminated; the urine had contained from 2 to 12 grammes ($\frac{1}{2}$ to 3 drachms) of sugar per hundred each time, in all 1.148 grammes ($17\frac{5}{8}$ grains), making 0.267 per cent. of the sugar ingested. A dog weighing 14 kilogrammes (30.8 pounds) was given, through an œsophageal tube, three days in succession, at 9 A.M., 80 grammes ($2\frac{1}{2}$ ounces) of pure glucose dissolved in 100 grammes ($3\frac{1}{4}$ fluidounces) of water. On the first day there was eliminated 5.12 per cent. of the sugar ingested; on the second day, 1.2 per cent.; on the third day, 0.57 per cent. A healthy subject absorbed, at 11 o'clock and at noon, 150 grammes ($4\frac{3}{4}$ ounces) of levulose, the elimination lasting till 10 P.M. In all 1.8 grammes were eliminated, or 0.59 per cent. of the quantity ingested. The same dog and another one ingested in one dose from 80 to 90 grammes ($2\frac{1}{2}$ to 3 ounces) of levulose, making about 5.5 grammes ($1\frac{3}{8}$ drachms) per kilogramme ($2\frac{1}{5}$ pounds),—that is, nearly the same quantity per kilogramme as the subject preceding. The two dogs eliminated more than the man,—more than 2 per cent. of the quantity ingested. The first dog received 80 grammes ($2\frac{1}{2}$ ounces) of maltose in 100 grammes ($3\frac{1}{4}$ fluidounces) of water, and eliminated 2.8 per cent. of the quantity. The author took, at 9 A.M., 320 grammes ($10\frac{1}{3}$ ounces) of cane-sugar in 450 grammes ($14\frac{1}{2}$ fluidounces) of an infusion of coffee and 225 grammes ($7\frac{1}{4}$ fluidounces) of water. He eliminated, in the space of eight hours, 1.08 per cent. of the sugar ingested, and exclusively in the form of cane-sugar. An adult ingested, in one dose, 200 grammes ($6\frac{1}{2}$ ounces), and on another morning 400 grammes ($12\frac{3}{4}$ ounces) of cane-sugar; he eliminated at one time 2.5 and at the other time 1.8 per cent. of the quantity ingested. An adult took 400 grammes ($12\frac{3}{4}$ ounces) of milk-sugar, the elimination taking place from the second to the eighth hour, with a maximum at the sixth, being 0.13 per cent. of the quantity ingested and in the form of milk-sugar. A dog eliminated more, also in the form of milk-sugar.

Linossier and Roque⁴⁵⁷_{No.2, '95} have confirmed the frequency of saccharosuria in the normal state when the quantity of saccharose exceeds 50 grammes ($1\frac{1}{2}$ ounces). This in the urine is often accompanied by a small quantity of glucose, resulting from the separation of the saccharose in the economy.

Brunelli⁴⁵⁷_{Dec., '94} gave from 150 to 250 grammes ($4\frac{3}{4}$ to 8 ounces)

of syrup (codex, containing 75 to 125 grammes— $2\frac{1}{2}$ to 4 ounces—of saccharose), fasting, to twenty-one patients suffering from saturnine colic. He found in more than half of them, in the hours following, several grammes of saccharose. This elementary glycosuria was absent during convalescence. The author believes that the action of lead upon the hepatic cells is not the only cause of lead colic and that some account should be taken of the alcoholism from which many workers in lead suffer.

Marinesco⁹²⁷_{June 22, '96} reports the case of a patient with acromegalia, suffering from double temporal hemiopia, passing from 10 to 12 litres (quarts) daily of a clear urine containing 48 grammes ($1\frac{1}{2}$ ounces) of sugar per litre, with a trace of albumin.

Etiology of Diabetes.

Davis,⁵_{July, '96} in an important study of the etiology of diabetes, claims that it appears more frequently in the months of March, April, July, and November, though he gives no explanation of this. He finds an increased mortality in winter (calculated on the statistics of twenty-nine years at Chicago), but the mortality-figure year by year is not in relation with the average temperature of the winter months nor with the increase of population.

Worms¹⁰_{July 29, '96} examined the urine of 607 individuals engaged in manual labor requiring great muscular and respiratory activity, but found no sugar in any case; while in the urine of 100 individuals engaged in intellectual work of a more or less fatiguing character, but always intense and sedentary, he found sugar in 10 of the cases, in varying proportions. The number of diabetics appears, indeed, to be constantly increasing, the mortality at Paris having more than doubled from 1883 to 1892 (136 deaths in 1883, 301 in 1892).

Rai Bahadur A. Mitra²³⁹_{June 1, '96} gives some interesting information bearing on the etiology of diabetes in India. He finds it extremely rare in the Hindoo woman. As regards its relation to alcohol, in 200 cases of diabetes, he found 4 intemperate patients, 107 temperate, and 89 total abstainers; 69 took opium habitually, 1 as much as 20 grains (1.3 grammes) daily.

K. G. Bose,²_{Feb. 2, '96} in a discussion before the Indian Medical Congress, said that diabetes was responsible for a very high mortality in some parts of India. He believed that one-tenth of the mortality of Calcutta was due either to diabetes or its consequences, and said that in one street alone, with a population of barely 1000 persons, he knew that 30 persons were suffering from the disease. Acute and chronic diabetes were both observed, but the latter more frequently. The disease was more common among the inhabitants

of towns and among zemindars and talookdars, who led an indolent life, than among the villagers. It was true that the Hindoos lived largely upon vegetable diet; but the theory that diabetes could be attributed to an excess of starch in the food did not bear examination. The Jains, who were great starch and sugar eaters, and the Sadhoos, Jogeos, and the Chowbays of Muttra, who lived upon sweets, did not suffer from it. He advanced evidence to show that occupation had no influence in the development of diabetes, and that the custom of early marriage could not be held responsible. On the other hand, disturbances appeared sometimes to be a direct and immediate cause of diabetes. As to hereditary influence the evidence was not clear, and the rapid succession of cases in a single family had led him to suspect the contagiousness of the disease. He insisted upon the association of dyspepsia and diabetes among natives of India, and believed that the changes in the habit of life, greater luxury, and increased indulgence in food were responsible, in some degree at least, for the increase which had taken place.

Infantile Diabetes.—Wegeli,¹⁵⁸_{B.19,H.1,*96} basing his remarks upon 108 cases, states that children of both sexes seem to be affected in an equal proportion, and that the disease is most frequently observed about the age of 5 years. As a cause he found traumatism in 11 cases, dentition, chill, excesses of various kinds, rapid growth, insufficient food, violent emotion, or sorrow in others. In one case convulsions had preceded the appearance of diabetes; in another it followed chloroform anæsthesia. Wegeli noted in several instances a similar heredity in the antecedents, while in others there was simply a nervous predisposition.

Comby¹¹⁸¹_{No.1,*96} observed the case of a nervous, emotional child, easily vexed, who used sugar to excess. The parents were neither diabetic, gouty, nor asthmatic, there being simply a tendency to obesity. The first symptom in the child which attracted the attention of the parents was great thirst. The child drank five or six litres (quarts) daily, and even more when first seen by Comby. There had never been a corresponding increase of appetite, while the emaciation was extreme. Examination of the urine gave the following results: Quantity in twenty-four hours, 5.5 litres (quarts); sugar, 65 grammes (2 ounces) per litre (quart); albumin, traces; urea, 3.2 grammes (49 grains) per litre (quart). It was thus a case of marked diabetes, the child losing daily 350 grammes (11 ounces) of glucose and 18 grammes (4 $\frac{3}{4}$ drachms) of urea,—a considerable amount for a child of 14 years and easily accounting for the great cachexia. Under the influence of bromide of potassium, sodium arseniate, and a strict diet improvement was soon

manifested and the emaciation arrested. The thirst diminished, and analysis showed but 41.5 grammes ($1\frac{3}{8}$ ounces) of sugar in twenty-four hours, the quantity of urine falling to 2 litres (quarts). This amelioration was, however, of short duration, emaciation again showing itself, the quantity of sugar increasing, and the child dying seven months from the onset of the disease. At no time was the heart or the lungs affected.

Broadbent ⁶_{Sept. 15, '94} describes a case of diabetes in a child of $4\frac{1}{2}$ years, following influenza. A remarkable feature is that the disease has lasted three years and that the glycosuria is more intense; there is weakness, constipation, and abolition of the knee-reflex. Opium has not influenced the glycosuria.

Jaworski ²²_{July 17, '95} also reports a case in a child which was 18 months old when it died of the disease. It was eleven months at the mother's breast. The parents were of strong, healthy stock and the child appears to have been very strong and healthy up to the sixth month, when it fell a distance of a foot and a half; but this did not seem to interfere with the nutrition in any way, as the child was of a strong, bony build when brought to hospital, one month before death. On admission the bowels were moved but once in three or four days. The thirst was the most noticeable symptom, the child drinking from 1.5 to 2 litres (quarts) in the twenty-four hours. It was cross, apathetic, but slept fairly well. The disease commenced with great thirst, hunger, and polyuria about three months before admission, or when it was 14 months old. The urine was acid, containing 6 per cent. of sugar, but no acetone. After antidiabetic treatment the amount of sugar fell to 2.5 per cent.; the appetite diminished and the emaciation went rapidly on, with the formation of boils on the body, till it died, four months after the first intimation of the disease. Jaworski is confident that heredity had no part in the causation in this case, and can discover no disease or likely cause unless it be attributed to the short fall.

Cnopf ³_{No. 18, '95} publishes a new case, in a child of $2\frac{1}{2}$ years, which had been healthy from birth. During a stay in the country it was noted that he did not increase in size as a child should do that ingested two or three litres (quarts) of milk a day. This fact finally led the parents to consult Cnopf, who found complete apyrexia, pallor of the skin, and marked emaciation. The heart and lungs were normal; the liver, spleen, and stomach appeared healthy, and there was no diarrhoea; but the child vomited the milk from time to time. Examination of the nervous system and of the eyes gave negative results. Finally the urine was examined and found to contain some albumin and a great deal of sugar. This fact was

hardly ascertained when the child developed diabetic coma and died in a few hours. No autopsy could be made. It was impossible to determine how long diabetes had existed in this case, and none of the usual causes of the disease in children could be assigned, such as heredity, cerebral or abdominal injury or convalescence from severe fever. The utility of examining the urine, even of children, is manifest.

Traumatic Diabetes.—F. A. Higgins and J. B. Ogden⁹⁹ discuss the literature of traumatic glycosuria, and pass in review 212 cases of traumatism of the head admitted into the Boston City Hospital within thirteen months. These they range in five classes: (1) wounds of the scalp; (2) wounds with denudation of the bone; (3) commotion, including cases followed by loss of consciousness, but without fracture; (4) fracture of the vault; (5) fracture of the base. Of the first class there were 84 cases, 5 of which, or 6 per cent., presented glycosuria; in the second class, 43 cases, 4 with glycosuria,—9 per cent.; third class, 40 cases, 1 with glycosuria,—2.5 per cent.; fourth class, 24 cases, 5 with glycosuria,—20.8 per cent.; fifth class, 21 cases, 5 with glycosuria,—23.8 per cent. In all, 20 cases of glycosuria in 212 cases. They conclude as follows: 1. That, after injury, sugar may appear in the urine as early as six hours and disappear within twenty-four, the average time for its appearance, however, being from eight to twelve hours, and for the disappearance of the same from the fifth to the ninth day. 2. That a small portion of the cases may exhibit a permanent glycosuria from the date of injury to the head. 3. That acetone and diacetic acid are rarely, if ever, found in such cases, except where the condition becomes a permanent glycosuria, and even then probably only after a number of months or years. 4. That, of the 20 sugar cases recorded in the paper, 11 (55 per cent.) had received an injury to the right side of the head, 5 (25 per cent.) to the left side, 3 (15 per cent.) to the occiput, and 2 (10 per cent.) where there was no external evidences of violence. 5. That it is impossible, in the present state of the knowledge of the pathology of diabetes and glycosuria, to draw any inferences from the necropsies which have been obtained. They are, however, reported in full. 6. There is little to be said in regard to the mortality. Of the 20 cases 8 died, 6 being the direct result of severe injuries, 1 from intercurrent disease, and 1 from the probable effects of alcoholism. In the 212 cases 16 were fatal, 50 per cent. of these having glycosuria. Albumin, together with casts and abnormal blood, was found in every case containing sugar, probably secondary in most instances to the renal irritation produced by the sugar, even though it had been eliminated only a short time.

According to W. Asher,³¹¹_{B.8,p.219; B.9,p.1} the appearance of diabetes following traumatism is frequent enough, and especially after injuries to the head. It is also not rare to observe diabetes after injuries to any other part of the body, particularly the spine and the sacral region, as well as the abdomen and especially the liver. Although met with at all ages, traumatic diabetes manifests a predilection for youth and middle age and for the masculine sex. It may appear the same day as the accident and may be acute or chronic, temporary or permanent; in the latter form it may cause death in from one to five years. The form and evolution of the disease is similar to that of idiopathic diabetes. In order to make a diagnosis the evolution must be observed; if it last two or three months without showing any tendency to recovery, there is little hope of complete recovery. In patients predisposed by constitution or heredity traumatic diabetes is a serious matter. Contrary to the opinion of Brouardel and Richardière, the author does not believe that the early or acute form offers a better prognosis than the retarded or chronic form.

W. Ebstein²²⁶_{B.54,H.2,3} discusses traumatic neurosis and diabetes, with special reference to accident-insurance. He first reports two cases of diabetes following neuroses. The first patient was a man, aged 45, whose previous health had been good. In a railway accident he suffered from general concussion, and directly afterward became very ill, the symptoms being those of bodily and mental shock. At first spinal disease was suspected, but, after an examination, Ebstein regarded the symptoms simply as those of traumatic neurosis. The symptoms persisted, and six years after the accident, while the patient was under observation in Ebstein's clinic on account of his nervous symptoms, it was discovered that he was suffering from diabetes mellitus. The urine had a specific gravity of 1035 to 1040; the daily quantity varied from 1100 to 2100 cubic centimetres (35 to 67 fluidounces), and the amount of sugar from 4.7 to 6.8 per cent. Occasionally a small quantity of acetone and aceto-acetic acid was present. At a later date the mental condition became very dull; the left leg became paralyzed and the left arm weak and afterward rigid. The right leg also became feeble and the knee-jerks became increased. The patient died and an autopsy showed that the paralytic symptoms were due to patches of cerebral softening the result of atheroma of the cerebral arteries. In a second case the patient was very stout and had suffered from gout. After a fall symptoms similar to those of traumatic neurosis developed, and about six months later symptoms of diabetes were discovered. Both patients were very stout. In both of these cases the onset of the symptoms did not

occur for a long time after the accident. The earlier the diabetic condition is observed after an accident and the greater the evidence that the symptoms were not present before the accident, the greater is the probability of a connection between diabetes and the injury. The numerous cases recorded in medical literature show that between trauma and diabetes, as well as between trauma and functional disturbances of the nervous system, there exists a causal relation. Ebstein thinks that between traumatic neurosis and diabetes there exists a connecting-link. In only a few cases of traumatic neurosis does diabetes develop. Most cases of traumatic diabetes appear to occur quite independently of traumatic neurosis. The fact that traumatic diabetes may develop not only after, but at the same time or almost at the same time as, the functional traumatic neurosis leads one to conclude that this form of traumatic diabetes must be regarded not as a result of the neurosis, but that both—neurosis and diabetes—must be regarded as the direct result of the injury.

Charnaux²⁰⁰⁰₉₄ believes in the existence of diabetes mellitus due to syphilis—which is probably more common than has hitherto been suspected—and coinciding with other tertiary symptoms. Sometimes it depends on specific nervous lesions, sometimes on syphilitic pancreatic alterations; again, it seems to be induced by syphilis in predisposed subjects. Under these three pathogenic heads we would have nervous, pancreatic, and parasymphilitic diabetes. The first two are amenable to the specific treatment alone; the third may be combated by the combined treatment of syphilis and simple diabetes, as is usually done in cases where the two affections coincide although of independent origin.

Leidy⁹_{Sept. 29, '04} reports two cases in which he thinks the glycosuria had some relation to an attack of appendicitis, though this connection is far from being proved.

Pancreatic Diabetes.—Sandmeyer³⁹¹_{B. 31, p. 12} extirpated the pancreas of two dogs, leaving one-ninth to one-fifth of the organ. The animals became diabetic,—one four and the other thirteen months after the operation,—the first dog succumbing two months and the second eight months later. During the course of the diabetes they were kept on an exclusively meat diet, which was assimilated in the proportion of 62 to 70 per cent. The absorption of fat was very variable, 40 per cent. of that of milk being absorbed. The addition of raw pancreas notably increased the assimilation of meat and milk, but it also notably increased the amount of sugar in the urine. Glyceirn did not show a marked influence. Although the animals lost in weight, the quantity of nitrogen sometimes showed a slight gain. No fatty degeneration of the organs was observed.

In dogs in which a larger portion of the pancreas was allowed to remain (a fourth to a half) the author determined that the administration of raw pancreas would produce glycosuria, the result being explained by the greater assimilation of carbohydrates from the meat diet.

Caparelli ⁴⁰⁹_{v.21,p.390} removed the pancreas from eels, which survived the operation from seven to twelve days; 7 out of 11 showed no sugar in the urine; 2 of them did. The former had, perhaps, retained pancreatic remnants.

W. Weintraud ²⁷³_{B.34,p.308} extirpated the pancreas of 19 ducks, 1 hawk, 2 buzzards, and 2 crows. Of the ducks, only 4 showed slight glycosuria; but, on the other hand, the 3 carnivorous birds were manifestly glycosuric until death; the urine of only 1 of the crows distinctly reduced Fehling's solution. In the case in which glycosuria was absent in the duck the author ascertained, by the estimation of sugar in the blood, that there was no hyperglycæmia.

Dreschfeld ⁹⁰_{Apr., '05} reports a case of acute diabetes due to cancer of the pancreas in a woman, 41 years old, ill only for two months and complaining simply of pain in the epigastrium. There was ascites. Death followed a few days after her admission to hospital from syncope due to hæmatemesis. The urine had been scanty, of a specific gravity of 1047, acid, without albumin, but with considerable sugar (20 grains—1.3 grammes—per ounce—30 grammes) and giving the reaction of Gerhardt with perchloride of iron, as well as the reaction of acetone. At the autopsy the pancreas was found to be hard and filled with friable cells, each a little larger than a pea. Near the middle of the gland were two large calculi of similar color and consistence; one about the size and shape of a date-stone, the other about three-fourths of an inch long and bent at right angles at one end. A large number of smaller calculi, varying in size from a pea to a pin's head, were scattered through the gland. The calculi were imbedded in the dilated pancreatic ducts and their branches. Little or no normal pancreatic tissue could be detected. The pancreatic growth extended in the most irregular manner into the surrounding parts at the posterior wall of the abdomen. Microscopical examination showed that there was carcinoma, the firmer parts presenting the appearance of scirrhus.

The case presents as point of interest that the symptoms on admission simulated those of cirrhosis of the liver, there being marked ascites, and the ill-defined mass, with resisting ridge, could easily be taken for an enlarged liver and a somewhat enlarged spleen. The presence of sugar in the urine is not of unusual

occurrence in cirrhosis, and in this case no increased thirst was noticed and there was only a small quantity of urine passed. The amount of sugar and the high specific gravity, however, clearly pointed to diabetes rather than glycosuria. Large quantities of urine and thirst were absent in this case.

Hansemann ^{114 5}_{B. 20; Mar., '96} divides diabetes into three groups of cases: (1) diabetes without alteration of the pancreas; (2) pancreatic disease without diabetes; (3) pancreatic disease with diabetes. As regards the first group, the author found cases, as had others, of diabetes in which the most minute examination failed to show alterations in the pancreas. In regard to the second group, one must remember that, according to Minkowski, the severity of experimental diabetes in cases of partial removal of the pancreas bears no relation to the amount of the gland remaining nor to the intensity of the evident anatomical change in that part. From this it can be understood that most cases of cancer of the pancreas and of cysts do not come under consideration. Cloudy swelling and fatty degeneration are not supposed to lead to diabetes because of the slight loss of function these changes involve. Cases of acute necrosis of the pancreas might be supposed to lead to diabetes. But, out of one hundred cases collected by Fitz and Seitz, only two had diabetes. Another case was observed by Frerichs. In most of these cases, however, the course of the disease was so short that it may easily be supposed there was no time for the development of diabetes (which does not occur at once after extirpation in dogs). In the cases of longer duration it may be doubted whether the whole gland was destroyed. Another disease which might be supposed to lead readily to diabetes is diffuse cancer of the pancreas. Two such cases were observed by Hansemann without diabetes. This the author explains by the ingenious supposition that the cells of the new growth continue the positive function of the cells from which they are derived.

Calculus with atrophy has been observed in combination with diabetes in some cases, but in others diabetes was not present. The author reports two more cases of this kind without diabetes. In these cases, however, the glands were partly unaffected. From the records of the Berlin Pathological Institute and the Augusta Hospital Hansemann was able to discover that the cases with the coincidence of disease of the pancreas and diabetes occurred more frequently than diabetes alone or pancreatic disease alone, and, in fact, oftener than these two combined.

The commonest disease of the pancreas found in diabetes, according to the author, is an atrophy which differs, both to the naked eye and microscopically, from atrophy as the result of

diabetes or of cachexias. Hansemann compares it with certain forms of contracted kidney. Its earliest anatomical signs are similar to those described by Lépine as periacinose sclerosis. This atrophy rarely leads to complete destruction of the pancreas. The process is not identical with fibroid induration of the pancreas, which results from acquired and congenital syphilis and which is sometimes observed in diabetics. As the result of his examination Hansemann formulates the following conclusions: There is nothing known which opposes the application of the results of experiments in canine pancreatic diabetes to man. The total destruction of the pancreas in man may be assumed to cause diabetes. If the pancreas is partly destroyed, diabetes may not appear. The destruction of the pancreas does not produce any special form of diabetes, nor has it any relation with age or sex. The alterations in the pancreas in diabetes are very manifold. Acute inflammation, necrosis, occlusion of the duct, atrophy from pressure, cysts, and spontaneous atrophy occur with or without diabetes. The only exception to this is the genuine atrophy (or the granular atrophy of Hansemann). This belongs to the chronic interstitial inflammations and seems to lead essentially to a lessening of the positive function of the pancreas. The precise histological change which is connected with this diminution of function the author does not attempt to state. Nothing can be recognized but a diminution in size, and at times slight fatty degeneration of the parenchyma-cells. Just as the genuine contracted kidney gives characteristic symptoms, so the granular atrophy of the pancreas leads necessarily to diabetes, whereas the other diseases only cause diabetes when sufficiently extensive.

De Massary ^{July 10, '95} reports the case of a patient, aged 39 years, who died of pneumonia in Rendu's wards in the Hôpital Necker. This man had been diabetic since recovering from influenza. Two examinations of urine showed 335 and 360 grammes ($10\frac{3}{4}$ and $11\frac{1}{2}$ ounces) of sugar daily, with 70 grammes ($2\frac{1}{2}$ ounces) of urea in twenty-four hours. Potier had carefully conducted the post-mortem in this case and found that the liver, which weighed 3.2 kilogrammes (7 pounds), presented hypertrophic cirrhosis with pigmentation throughout the hepatic cells, portal spaces, biliary ducts and vessels. The pancreas was large and striated, the glands being dissociated by fibrous tissue and the pancreatic cells infiltrated with pigment. The suprarenal capsules were also much pigmented, especially the portion rich in lymphatic vessels. The semilunar ganglion was normal. The nature of the pigment was carefully studied, and in treating different sections with hydro-sulphate of ammonia a sulphide of iron was produced which

stained them black. It was thus shown to be blood-pigment, and it must be concluded that hæmoglobin furnished the pigmentary matter.

Dieckhoff, ²⁰²³₉₆ in an extensive study of the pancreas, discusses pancreatic sclerosis in its relation to diabetes, without throwing any new light upon the subject.

Pathogenesis.

The question of the glycolytic ferment has made a decided step forward through the discoveries of Lépine, ⁹²⁷_{Jan. 25, '95} who has been able to produce this ferment by treating the saliva, or any solution of amylate, or the pancreas itself, by sulphuric acid diluted to 1 to 1000. Lépine and Martz ⁴⁵⁷_{Mar. 1, '95} publish the method, with details. It is as follows: To a litre (quart) of acidulated water as above 5 grammes (1½ drachms) of diastase are added. This is heated to 35° or 38° C. (95° or 100.4° F.) for some hours and then neutralized with sodium bicarbonate. The liquid has lost all saccharifying power, but it possesses a glycolytic power sufficient to destroy, in one hour at 38° C. (100.4° F.), about 10 per cent. and even more sugar if added in the proportion of 0.5 gramme (7½ grains). (This liquid contains sugar introduced by the diastase, all the diastases in the market containing a small proportion. This sugar has not been destroyed, seeing that the fluid had no glycolytic power, inasmuch as it was acid.) Thus prepared, the glycolytic ferment possesses the property of the glycolytic ferment normally contained in the blood. It is to be noted that it does not appear to be dialyzable. Lépine and Martz have also prepared a glycolytic ferment by treating fresh pancreas with two parts of a solution of sulphuric acid at 1 or, better, 2 per cent. With the pancreas of certain dogs they obtained, after some hours of maceration at 38° C. (100.4° F.) and neutralization, a solution of glycolytic ferment capable of destroying about 40 per cent. of sugar added (in the same proportions as above). With the pancreas of other dogs, however, the loss is very small; in a general way it may be said that beef-pancreas yields a much more active ferment.

Spitzer ²⁴⁶_{B. 60} has made researches bearing on the difficult question of the glycolytic power of the blood and tissues. He ascertained that glycolysis took place in oxalated as well as in defibrinated blood, and, as Lépine has shown, that a 6-per-cent. solution of sodium chloride that has been in contact with the blood-corpuscles has a glycolytic power and that the organs have not anywhere near as great a glycolytic power as the blood. He also found that, in the absence of oxygen, glycogen was absent. As to the exact nature of the ferment, he supposes it to be identical with the

oxidizing ferment discovered by Schmiedeberg and Jacquet in the tissues. He then launches out into the consideration of theories tending to prove that this ferment may be no more than a mode of activity of molecular oxygen.

[It seems difficult to reconcile this entirely speculative view with the fact that the glycolytic ferment is removed from the blood-corpuscles by salt water.—R. L.]

Kaufmann⁴¹⁰_{Apr., '96} states that he has estimated the urea in the blood of ten dogs in a normal condition and of ten others rendered diabetic by the extirpation of the pancreas. He found (per 1000) 0.294 gramme ($4\frac{1}{2}$ grains) in the first and 0.656 gramme (10 grains) in the second. The animals had all been fasting for 12 hours.

After section of the vagus nerve at the neck the glycaemia was not sensibly modified for about fifteen hours, when hypoglycaemia supervened, becoming more and more marked until death. If the pancreas of one of these animals were extirpated hyperglycaemia and glycosuria developed as usual. The same is true when the pancreas is extirpated from a dog that has undergone section of the diaphragmatic or splanchnic nerves or all the nerves of the liver. From the preceding facts the conclusion should not be drawn that the nerves of the liver exercise no influence on the hyperglycaemia; as is known, if the splanchnic nerves be first cut, puncture of the floor of the fourth ventricle is not followed by hyperglycaemia (Bernard), and that anæsthetics also do not produce it; and, finally, that such puncture, in an animal rendered diabetic by ablation of the pancreas, intensifies the hyperglycaemia (Hédon). Kaufmann adds that puncture of the floor may also produce the condition in an animal in which all the nerves of the liver have been cut, but in which the nerves of the pancreas are intact. Thus, it is certain that this organ receives the freno-secretory nerves for internal secretion, and that these are irritated by puncture of the bulb. According to Kaufmann, in animals in which the liver is deprived of nerves and the pancreas extirpated, and consequently already hyperglycæmic, puncture exaggerates the condition. This result he explains by supposing that puncture increases histolysis of the tissues, which is regulated, as is the intra-hepatic formation of glucose, both by the internal secretion of the pancreas and by the nervous system. In hyperglycaemia consecutive to section of the spinal cord the diminished sugar formation in the liver is not accompanied by an accumulation of glycogen in that organ, as Bernard supposed, but by an increase of glycogen in the muscles through diminished histolysis.

If a dog be submitted successively to the three following operations—viz., section of the spinal cord in front of the first dorsal, section of the nerves of the liver, and extirpation of the pancreas—hypoglycæmia will be observed. This Kaufmann believes to be the result of an inhibition of the liver supervening at the moment the cord is cut, and persisting (!); for if the operations are done in the following order—viz., section of the nerves of the liver, section of the spinal cord, and removal of the pancreas—hypoglycæmia is not always observed, but sometimes hyperglycæmia. If one cut the two splanchnic nerves, the spinal cord, and extirpate the pancreas, hypoglycæmia ensues.

Thirollox⁹²⁷_{Mar. 30, '06} states: 1. That there is a bulbo-hepatic diabetes independent of the pancreas. Animals with a pancreatic graft become glycosuric from puncture of the bulb, in the same manner as normal animals. The same is true of animals from which the pancreas has been removed while fasting, and which are not glycosuric. 2. Section of the nerves of the liver leads to a marked diminution in the size of the organ, but not to marked disturbances in the health of the animals (for two or three months following). 3. The pancreas continues to furnish its double secretion—external digestive and internal glycogenic—after section of its nerves. 4. Section of the nerves of the liver, practiced at the same time or before or after total extirpation of the pancreas, does not prevent the appearance of glycosuria, though it may be more tardy and more serious than in dogs in which the liver is intact. 5. Grafting of the pancreas, together with section of the hepatic nerves, permits the establishment of normal glycogenesis and an hepato-pancreatic glycosuria of cellular type. The internal secretion of the pancreas appears, therefore, to directly influence the hepatic cells through the medium of the blood of the portal vein or the arterial blood.

Töpfer⁵⁷_{Jan. 20, '06} has found that a watery extract of the dejections of diabetic patients caused toxic symptoms when injected under the skin of animals. A substance is found in the urine of the latter which gives all the reactions of sugar. This glycosuria appears twenty-four hours after the injection and lasts for several days. The quantity of sugar found in dogs was from 0.06 to 0.15 per cent. Injection of a similar preparation from healthy individuals is without effect, or gives rise to but a slight and transitory glycosuria; on the other hand, the repeated injection of diabetic dejections produces a glycosuria which may reach as high as 0.30 per cent.

Töpfer draws from these experiments the following conclusions in regard to pancreatic diabetes: The pancreas is an anti-

toxic organ, destined to destroy certain toxic substances formed in the intestines. When these are produced in too great a quantity, or when the pancreas becomes insufficient, as in diabetes, the toxicity of the dejections increases.

[This theory has already been proposed by de Dominicis, but is absolutely untenable.—R. L.]

Lépine,²¹¹_{July 21, '05} having had occasion for some years to perform venesection in seven diabetic patients, was able to compare the percentage of sugar in the blood and urine and to convince himself that there is no close relation between them. In four patients who showed the same quantity of sugar per litre (between 60 and 70 grammes— $1\frac{3}{4}$ and $2\frac{1}{4}$ ounces) the blood contained, respectively, 5.1, 4.5, 3.5 and 3.3 per cent.; and the patient who had 5.1 per cent. of sugar per litre (quart) of blood was not the one who had the greatest proportion of sugar in the urine. In another patient who had been bled for cerebral accidents at intervals of several days, there were, the first time, 2.8 grammes (43 grains) of sugar in the blood and 25 grammes ($6\frac{1}{2}$ drachms) in the urine; the second time, 2.6 grammes (40 grains) in the blood and 55 grammes ($1\frac{5}{8}$ ounces) in the urine,—in consequence, an inverse ratio. The fact that more sugar is excreted by the urine on a certain day than on others does not depend on the fact that the amount in the blood has reached a certain quantity, but on other complex conditions. In forty dogs rendered diabetic by extirpation of the pancreas Lépine followed the progress of the glycosuria and the hyperglycæmia during a period of from twenty to thirty hours. These animals were not all in the same physical condition at the moment of operation; some had been previously well nourished, others had suffered, but all had received no solid nor liquid food for twenty hours before removal of the pancreas, and were afterward kept in a state of complete inanition. The following are the observations recorded: From five to ten hours after operation glycosuria appeared in the urine. At this moment hyperglycæmia was very slight. Several times the amount in the blood did not exceed 1.9 grammes ($29\frac{1}{2}$ grains) per litre (quart); then the glycosuria increased rapidly and in a few hours exceeded 50 grammes ($1\frac{1}{2}$ ounces) per litre (quart). The hyperglycæmia was not yet very great, but it decreased, and it not rarely happened that, about thirty hours after the operation (fifty hours after the beginning of inanition), the urine was almost entirely devoid of sugar. But at this moment the proportion of sugar in the blood had greatly increased. The more or less rapid decrease of glycosuria from the twentieth to the thirtieth hour after extirpation of the pancreas is certainly not extraordinary, in view of the state of inanition of the

animals; but the increasing hyperglycæmia, which continued at this time in spite of the decreasing glycosuria, is to be noted. This discordance between the two is constant under like conditions, and is certainly due, at least in great part, to the fact that, twenty or thirty hours after ablation of the pancreas, the kidney does not so easily eliminate sugar as several hours earlier. It proves that the administration of a diuretic diminishes hyperglycæmia and retards the decrease of glycosuria; but it remains to be determined why the kidney is less active.

Nutrition.

Pautz³⁹¹_{B.32,p.197} has made a comparative study of the nutrition in 4 healthy subjects and 24 diabetics, and finds that in the former 5 per cent. of nitrogenous material and 3.5 per cent. of fatty matters are lost by the fæces. In diabetic subjects the average loss of nitrogenous substances is somewhat greater (7.5 per cent.), while that of the fatty matters is, on the average, about the same. There are, however, considerable individual variations, which for nitrogenous substances range from 1.7 to 13 per cent., and for fats from 1 to 9 per cent. The duration of the disease exercises some influence. Thus, in a case which has not lasted longer than one year the loss of nitrogenous substances is 6.67 per cent., of fats 3.43 per cent.; in cases lasting from one to six years, nitrogenous 7.44 per cent., fats 3.83 per cent.; in cases dating back more than five years, nitrogenous 8.86 per cent., fats 3.26 per cent. Among the 24 cases of diabetes studied, none presented the form recently pointed out by Hirschfeld,—that is, those in which, with a copious ingestion of alimentary matter, there is but slight absorption of these.

The question as to whether the nutritive exchange is more active in diabetics than in healthy persons is answered by the author in the negative. In other words, the diabetic has no more need of caloric than a healthy man,—a deduction naturally drawn from the fact of the elimination of caloric in the shape of sugar by the urine. In the 24 cases he found only one exception to this rule,—a child of 12 years suffering from severe diabetes.

Vaughan Harley¹⁷⁸_{V.18,Nov.1,2, '96} has studied the elimination of the fat of milk in the healthy dog and the dog submitted to extirpation of the pancreas. If 1.5 grammes (23½ grains) of pure cream be given to a healthy dog, from 20 to 45 per cent. of it will be absorbed at the end of seven hours, the remainder being found in the stomach or intestines. In the dog deprived of the pancreas a greater quantity of the fat is found in the stomach at the end of the same period,—no doubt, on account of diminished peristalsis.

Weintraud, ²⁷³_{B.34,p.169,'94} in a diabetic with a great tolerance for fatty substances, was able, by the suppression of carbohydrates from the food and one day of absolute fast, to cause the sugar to permanently disappear from the urine. Diacetic and oxybutyric acids continued to be excreted in the same proportions. The administration of alkalies, without modifying the excretion of nitrogen, led to a notable increase of acetonuria, the organic acids being without effect on the latter. Alimentation with carbohydrates caused its diminution. Glycerin, in doses of from 100 to 150 grammes ($3\frac{1}{4}$ to $4\frac{3}{4}$ ounces), brought about the same result, but caused in the patient, who was no longer glycosuric, an excretion of 46 grammes ($1\frac{1}{2}$ ounces) of glucose daily.

Pathology.

Arthur Clarence Jacobson ¹⁵⁷_{Nov., '94} relates an interesting case of diabetes decipiens (diabetes without polyuria), and adds some judicious remarks on the subject. Teschenmacher ⁶⁹_{Apr. 25, '96} has also seen a case of the same kind in a woman of 60 years, suffering from eczema of the genitals rebellious to all treatment, and in whom the quantity of urine excreted during twenty-four hours varied between 1000 and 1100 cubic centimetres (32 to $35\frac{1}{4}$ fluidounces), although it contained 12 per cent. of sugar. When, under the influence of therapeutic measures, the glycosuria began to diminish, the quantity of urine showed a parallel increase, to reach its normal amount when the sugar had completely disappeared from the urine. The author justly remarks that cases of this kind may be brought as an argument against Vogel's theory that diabetic polyuria depends upon a greater absorption of water from the tissues by the blood-serum charged with sugar, thus causing increased vascular pressure and increased diuresis. The author confirms the frequency of cramps in the calves of the legs in diabetics,—a symptom to which Unschuld has recently called attention. Finally, he states that he has had the opportunity to convince himself that diabetes frequently begins in the form of an obstinate gastric catarrh; and he recommends examining the urine for sugar in all patients suffering from rebellious catarrh of the stomach, recurring in spite of all treatment.

Bremer ³⁶⁵_{Dec. 8, '94} describes a modification of Ehrlich's method of staining cover-glass preparations of blood with eosin and methyl-blue. By this method of staining in normal blood the red blood-corpuscles appear brownish red, but the color varies from a clear reddish brown to a deep chestnut brown. The nuclei of the leucocytes stain blue. Bremer found that in diabetes and glycosuria the red blood-corpuscles either remained completely unstained

or they were simply tinted light yellow or greenish yellow. Only occasionally a small peripheral zone of the red corpuscle was tinged slightly red. Other minor changes were found in the leucocytes. With acid fuchsin, and other so-called acid dyes, the red corpuscles of diabetic blood stained just in the same manner as those of normal blood. It was only eosin which did not stain them. In order to determine whether this loss of staining affinity for eosin was due to the abnormal amount of sugar in diabetic blood, Bremer treated cover-glass preparations of normal blood with a solution of sugar; but he found that the red corpuscles still stained with eosin, as in normal blood. If, however, a cover-glass preparation of non-diabetic blood were floated for twenty-five to thirty minutes in a diabetic urine, the red corpuscles failed to stain brownish red with eosin; they remained unstained or were only slightly tinted yellow or greenish yellow, as in diabetic blood. But the red corpuscles in a cover-glass preparation of non-diabetic blood, treated with urine free from sugar, stained well with eosin. In glycosuria produced artificially by the administration of phloroglucin for three days, the red corpuscles failed to stain with eosin, as in diabetes.

G. Jacobson ¹⁰⁰_{Aug. 25, '94;} ⁹⁰_{Oct.} has observed that the frequency of albuminuria in diabetes is variously stated. By some it is said to occur in 5 to 10 per cent., by others in 50 to 66 per cent. of diabetic patients. These discrepancies can easily be explained, however. While some authors include in their statistics only cases in which there is distinct evidence of nephritis, others include cases in which there is the least trace of albumin, the frequency of albuminuria also varying according to the age, sex of the patients, and the form of diabetes. In infants it is rare, while in adults it is most frequent from the age of 45 to 55; in old men diabetes is most frequently accompanied by azoturia and albuminuria. According to Lecorché and Talamon, albuminuria exists in 50 per cent. of male diabetic patients, while it is only met with in 11 per cent. of females.

Two forms of the albuminuria of diabetes are met with: a benign form and a grave form. In the benign form the general condition of the patient is usually excellent. The quantity of urine is abnormal,—two to three litres (quarts) in the twenty-four hours; the density is 1019 to 1025; the amount of albumin is always minimal and the albuminuria is always intermittent. This form is not accompanied by symptoms of nephritis, and uræmic headache, dyspnoea, serous effusions, and *bruit de galop* are not met with. It is latent, is recognized only by the examination of the urine, and remains latent or passes into the grave form.

The grave form is sometimes latent, but most frequently it is indicated by symptoms of Bright's disease. The albumin in the urine is abundant and the signs and complications of Bright's disease (œdema, headache, ocular troubles, dyspnœa, and *bruit de galop*) are met with. The urine is generally increased in quantity when the condition of the kidney is that of interstitial nephritis; but when it is that of parenchymatous nephritis the quantity is less and almost always abnormal. The specific gravity is diminished in the cases of interstitial nephritis, most frequently, however, remaining above normal. The albumin is more abundant than in the benign form, and epithelial and granular casts are also found. The albuminuria of renal origin often appears at an advanced period of diabetes, but may appear earlier, and sometimes suddenly at the same time as the acetonæmia in diabetics whose urine previously contained no albumin (acute albuminuria of Maguire). After albuminuria has appeared in the urine in the grave form it rarely disappears completely. The amounts of sugar and albumin secreted often bear no relation to each other, and in some rare cases the quantities of albumin and sugar are in inverse ratio; as the albumin increases the sugar diminishes, and not infrequently it disappears completely.

The symptoms vary according to the condition of the urine. Thus, in a case of diabetes presenting the typical symptoms the polyphagia and the polydipsia diminish and then disappear at the same time as the glycosuria, while as the albumin replaces the sugar uræmic symptoms appear.

In pancreatic diabetes albuminuria is quite exceptional, and almost always due to some other cause than diabetes. In traumatic diabetes albuminuria is a little more frequent. Claude Bernard long ago showed that glycosuria and albuminuria could be produced by puncture of two points in the floor of the fourth ventricle. Numerous clinical observations have demonstrated the relation between traumatism and glycosuria with albuminuria; observations and experiments have also shown that glycosuria with albuminuria does not always indicate a bulbar lesion, but may be produced by lesions of the brain, the bulb, the cord, the nerves, especially the pneumogastric nerve. When sugar and albumin are present in the urine in this class of cases they are probably due to the same cause. It is in diabetes with obesity that albuminuria is by far the most frequently met with.

In the grave form of the albuminuria of diabetes well-marked nephritis is always found at the autopsy; in the benign form sometimes slight nephritic changes are found, but more rarely no changes are detected in the kidneys.

The acute albuminuria of Maguire may arise from an acute nephritis produced by various causes, and thus may give rise to the retention of toxic products and the onset of diabetic coma; or, from the elimination of toxic substances which are the cause of acetonæmia, may set up a toxic nephritis.

The prognosis varies according to the form of albuminuria. The benign form is simply incidental, but ought to cause attention to be directed to the kidneys, as frequently these patients finally suffer from Bright's disease. According to Bouchard, this form of albuminuria indicates a profound disorder of nutrition, often accompanied by diabetic phthisis. The grave form is in itself a serious complication, especially as the nephritis occurs in a diabetic person,—*i.e.*, in a subject whose resistance to the disease is diminished, in whom the dietetic treatment of Bright's disease cannot be employed.

In case of acetonæmia (diabetic coma) the renal lesion becomes a most important aggravating factor. It does not permit the elimination of toxic products, and one can understand how the nephritis may be one of the chief factors leading to the toxic symptoms. The replacement of sugar by albumin is always an extremely grave sign, but the case may not immediately terminate fatally.

Marie, ³_{May 22, '96} after reporting a case of *diabète bronzé* ("pigmentary hypertrophic cirrhosis with diabetes mellitus" of Hanot and Chauffard), gives a general description of this rare disease, of which only nine certain cases, all by French observers, and two doubtful ones have been published. 1. Etiology: It appears in the second half of adult life and is more common in males than in females. Cause, possibly alcoholism. 2. Onset: Rather sudden, with all the classical signs of diabetes mellitus, together with gastric and respiratory disorders. 3. Symptoms: (*a*) Those of diabetes mellitus, the polyuria, however, being moderate, while the glycosuria amounts to 150 to 350 grammes (4½ to 11 ounces) in the twenty-four hours, but diminishes or disappears toward the fatal end. (*b*) Abdomen: Distension almost constant, but ascites slight; considerable hypertrophy of liver, which is of wooden hardness and tender. There is no true icterus as a rule, but the urine is high-colored without containing bile-pigments. The superficial abdominal veins are enlarged; the spleen is hypertrophied; digestion is often retarded, and diarrhœa, alternating with constipation, is present usually. (*c*) Emaciation and enfeeblement rapid. (*d*) Œdema of legs generally present. (*e*) The cutaneous pigmentation is brown or even gray-black, more or less uniform; most marked on the face, extremities, and genital organs, but is

absent on the mucous membranes, and no spots are present (difference from Addison's disease). In some cases it has been wanting. (*f*) Nervous: Loss of sexual power, absence of knee-jerk and insomnia as in diabetes. 4. Duration: Average, eleven and a half months. The temperature is raised toward the end, the œdema and ascites may become considerable, and purpura may appear. 5. Morbid anatomy: (*a*) Macroscopical: (1) liver enlarged, dense, and rust-colored; surface generally hob-nailed, but may be smooth; bile-passages normal; (2) intestines, mesentery, and peritoneum of a slate-black color (in author's case also covered with miliary tubercles); (3) spleen, mesenteric and mediastinal glands enlarged, sclerosed, and of a reddish-brown rust color; (4) pancreas sclerosed and rust-colored, duct patent; (5) kidneys and vessels normal; (6) heart usually normal in size or even dilated, with flaccid, reddish-yellow walls, but in author's case it was atrophied; (7) lungs frequently tuberculous. (*b*) Microscopical: Liver shows inter- and intra-lobular cirrhosis, with masses of ochre-colored pigment between connective-tissue fibres and in hepatic cells, some of which are crowded with pigment and disintegrate. Pancreas cirrhotic with pigment in connective tissue and parenchyma. In the lymphatic glands the pigment almost obscured their structure; kidneys pigmented to a less degree. The heart in author's case presented pigmentary degeneration of muscular fibres and sclerosis of pigmented fibrous tissue. 6. Pathogeny: The pigment is ferruginous; thus the liver contained, in the author's case, 11.3 per thousand of iron (normal amount 0.4 per thousand), and the lymphatic glands 18.5 per thousand (normally a trace only). This probably accounts for the color of the peritoneum and intestine, sulphide of iron being formed by decomposition. The pigment must thus arise from hæmoglobin and is probably formed chiefly in the hepatic cell. Marie considers this disease to be an entity, and not an accident supervening in the course of ordinary diabetes.

According to Grube⁶⁹_{Nov. 23, '95} the knee-reflex is of no prognostic importance in diabetes. In 33 mild cases he found it absent twelve times; while in 6 severe cases it was absent but once, and then only on one side. In 170 cases he found it absent twenty-three times.

Fraser and Bruce³⁶_{May, '95} examined a case of diabetic neuritis in which there was a central scotoma without anything visible by the ophthalmoscope. Post-mortem examination showed a zone of degeneration in the optic nerve.

Vergely,¹⁸⁸_{'94} who has already published 4 cases of diabetic angina pectoris, adds 5 new cases, in 1 of which death occurred

suddenly during an attack. The other patients recovered from their attacks. The author believes that angina pectoris of diabetic origin has the same symptomatology as that of non-diabetic origin, but that the glycosuric dyscrasia has a direct action upon the nerves of the heart.

H. Davidsohn⁴_{Dec. 17, '04} reports a case of otitis media diabetica, and discusses the three questions that have been raised by the reports and observations of Kirchner, Kuhn, Moos, Schwabach, and Körner as to (1) what is the etiological relation between the constitutional disease, diabetes, and the local affection of the ear? (2) what part of the ear is primarily affected, the tympanic cavity or the cells of the mastoid? and (3) when should operation be undertaken during the diabetes? As to the first question, the patient having had a very similar otitis over twenty years before, when the diabetes did not exist, Davidsohn thinks that on both occasions it arose from micro-organisms which found their way to the ear through the Eustachian tube. The only etiological influence that the diabetes exerted was the lowering of the vitality of the tissues. To the second question he answers that, in this case at least, though it is contrary to the opinions of most authorities on the subject, the clinical course of the disease shows that it was primary in the tympanic cavity and only secondarily a mastoiditis. The ideal time for operating is when, under constitutional treatment, the diabetes has begun to recede, for then we get prompt and satisfactory healing; but practically Schwabach's axiom is best: "Even in diabetes the indications for opening the mastoid are the same as when diabetes does not exist as a complication." In mastoid disease the urine should always be examined for sugar, and in those cases where there is a suspicion of diabetes, though no sugar be found, further tests should be made after the operation is completed.

Rovere,⁵⁸⁹_{v. 10, p. 3, p. 50} in a case of severe diabetes in Bozzolo's clinic at Turin, observed articular and muscular pains, with fever, swelling of the joints, œdema of the skin, and multiple furuncles in the pus of which was found the staphylococcus pyogenes aureus. The same microbe was found in the urine, in the exudate from a joint, and, at the autopsy, in the lungs, the kidneys, and the muscles, the latter being the seat of a suppurative myositis.

Paul Ernst²⁰_{B. 137, H. 3, p. 486} observed all forms of fungi in a case of diabetes, the staphylococcus aureus among the microbes, bacilli of the group of bacterium coli, saccharomycetes, and aspergillus fumigatus. The case manifestly shows that diabetes is favorable to the development of the various fungi.

Weintraud,²⁷³_{B. 34, p. 169} having recalled that Kossel obtained nucleic

acid from levulinic acid (or acetylpropionic), sought to determine if the latter would give rise to acetone. He injected into the veins or under the skin of the rabbit and dog levulinic acid in the form of a sodium salt or lime. He also caused it to be ingested, and observed in the urine of the animals a volatile substance giving the reaction of acetone. Levulinic acid also appeared in the urine, but in diabetic patients and healthy individuals he did not remark that the administration of levulinic acid exercised any effect upon the reaction for acetone.

Hirschfeld¹¹⁴_{B.28,H.1,2} has studied acetonuria in eighteen healthy subjects by first measuring the quantity of acetone, and then submitting them to a certain diet and again measuring the acetone. These researches show that in healthy persons submitted to a diet from which carbohydrates are absolutely excluded the quantity of acetone increases progressively for seven or eight days and then becomes stationary at from 0.02 to 0.03 gramme ($\frac{1}{3}$ to $\frac{1}{2}$ grain). It can be detected by Gerhardt's test. Acetonuria is less with a diet rich in albuminoids than with one in which a smaller amount of these is given, and it remains the same when a certain proportion of fat is given in addition. It may, therefore, be concluded that acetonuria does not depend upon the decomposition of albuminoid substances in the organism. Besides, in cases of comparative inanition the acetonuria is the same as when the needs of the organism are supplied by a diet of albuminoids and fats. The intensity of acetonuria varies greatly according to the individual, the variations depending less upon differences in physiological acetonuria than upon modifications consequent upon a diet from which carbohydrates are excluded. It appears that physiological and experimental albuminuria is more marked in elderly than in young persons. Acetonuria due to diet may be made to disappear in two or three days by the administration of 50 to 100 grammes ($1\frac{1}{2}$ to $3\frac{1}{4}$ ounces) of carbohydrates; but if the diet is composed of an insufficient quantity of carbohydrates, of albuminoids, fats, and 20 grammes (5 drachms) of bread, an increase of physiological acetonuria may be observed, the latter, however, not exceeding 0.01 gramme ($\frac{1}{6}$ grain) of acetone in twenty-four hours. Among the carbohydrates capable of diminishing experimental acetonuria the author mentions bread, cane-sugar, grape-sugar, milk-sugar, mannite, and glycerin. Alcohol has no such action, and physical labor also does not diminish it, while Carlsbad water, antipyrin, and sodium salicylate are without any influence. In patients with cancer, fever, or gastric disease the administration of carbohydrates diminishes acetonuria, and, inversely, this increases when the patients are submitted to a diet devoid of carbo-

hydrates. This acetonuria, which has all the characteristics of physiological albuminuria, which it approaches even to the quantity of acetone eliminated, is not peculiar to these pathological conditions and is not induced by them.

In another article the same author ⁶⁹ June 27, '95 gives the results of his researches as to the relation between acetonuria and diabetic coma, based on a study of 10 cases of diabetic coma,—7 in relatively young persons and 3 in old men with gangrenous complications. The first point which the author makes is that diabetes complicated by acetonuria is rather rapid in its evolution and terminates in death in from twelve to twenty months in cases in which there are no symptoms of gangrene. This form, or rather acetonuria with diabetic coma, is met with in individuals who are still comparatively young. The glycosuria is relatively great, and it is seen that the carbohydrates given are entirely eliminated by the urine in the form of sugar and that the latter does not disappear from the urine even when a strict meat diet is administered. What is the cause of the diabetic coma to which all these patients succumb? For a long time—since the work of Küssmaul—increased fatigue or overwork has been assigned as the cause, and in two of Hirschfeld's cases this was noted; however, as this author justly remarks, exercise is recommended in the treatment of diabetes by Trousseau, Külz, and others. Another element which Hirschfeld invokes is insufficient nutrition, he having remarked that emaciation from want of sufficient alimentation preceded the appearance of coma. In his opinion a meat diet, with its 500 grammes (16 ounces) per day, and the quantity of fat necessary for the preparation of the food, is not sufficient for the daily ration of the diabetic, and he believes that the relation between diabetic coma and an exclusive meat diet depends on nothing else but the fact of insufficient nourishment. Febrile affections occurring in the course of diabetes do not seem to be incriminated in the etiology of coma, though influenza in two cases closely preceded the outbreak of coma. The diagnosis of diabetic coma is easy, though the existence of abortive forms must be recognized, these ordinarily terminating in rapid recovery. Apart from this group, in which the appearance of acetonuria is of grave prognosis, there is another group, embracing cases of chronic diabetes, of benign evolution in elderly subjects. Here acetonuria appears when gangrenous symptoms present themselves, ending rapidly in diabetic coma. The treatment of diabetic acetonuria should, above all, aim at hyperalimentation (carbohydrates in small quantities, albuminoids in not too great abundance, fat, and alcohol) and rest,—that is, avoidance of all

fatiguing physical exercise. As to the treatment of coma itself, most of the methods recommended (alkalies in large doses, glycerin, etc.) almost invariably fail.

Klemperer, ³⁴_{May 14, '95} as assistant in Leyden's clinic, has observed twenty-one cases of diabetic coma and has endeavored to determine whether it is due to an acid intoxication. A striking fact is that all the patients eliminated large quantities of acid. This was proved by examination of the urine. The greater the quantity of ammonia, the greater the amount of organic acids, and, the less carbonic acid in the blood, the more acid was present. Does this fact alone authorize us in concluding that the acid is the cause of the coma? Klemperer does not hold this opinion, and for two reasons: In the first place, researches concerning nutrition have shown that a comatose condition may occur in consequence of increased destruction of nitrogenous material in other maladies, as in pernicious anæmia; secondly, the administration of alkalies is without effect. In nine cases large amounts of alkalies were given by injection without preventing a fatal issue. It has been objected that the alkalies were given too late, after the acids had already caused irreparable lesions of the nervous system. The following case, however, is a reply to that objection: A man, aged 21 years, under treatment for grave diabetes, took, in addition to an appropriate diet, 20 to 25 grammes (5 to 6½ drachms) of bicarbonate of sodium on account of the presence in the urine of a large quantity of ammonia, which indicated an increase of acids. Three or four weeks later the ammonia of the urine had diminished, the urine was often alkaline, and an examination of the blood only showed a slight decrease of carbonic acid (from 30 to 24). The patient died comatose on the very day of that examination. Klemperer believes that there probably exists in the blood a toxic substance which produces an increase of acidity and coma, but that we know no more. From a prophylactic point of view and as a means of restricting nitrogenous destruction he recommends fatty substances. It is necessary to give not less than 250 grammes (8 ounces) of fat daily; many patients support that quantity well and utilize it (10 to 15 grammes—2½ to 3¼ drachms—of loss). Some weeks later, however, disgust may develop and the loss increase to such a degree that a change of regimen will be demanded. A good adjuvant method consists in replacing hydrocarbons by milk (Leyden) or levulose (60 to 80 grammes—1¾ to 2½ ounces). Glycerin, which has been recommended, is not supported, but passes through the system without change. Several varieties of sugar have also been tried (up to the present time one hundred and twenty-nine kinds have been artificially obtained). Klemperer has also experimented

with a tetratomic sugar (erythrite) with success in one case. Pentose (a pentatomic sugar), recommended by Ebstein, behaves like glycerin. Some have thought favorably of alcohol as a means of checking waste (50 grammes—1½ ounces—a day).

Rumpf⁴_{Nov. 31, '95} publishes a case of diabetic coma without oxybutyric acid. (See ANNUAL for 1895, cases of Roger, Devic, and Hugounenq.) There was acetone, diacetic acid, almost 7 grammes (1¾ drachms) of ammonia daily, lactic acid, and volatile fatty acids. The kidneys showed epithelial lesions of the convoluted tubules (plasmolysis), some nuclei being necrosed, and there being also glycogen in Henle's loops.

Diagnosis and Prognosis.

Von Noorden³¹⁹_{May 25, '95} draws attention to the early diagnosis of diabetes, since treatment in the early stages offers considerable hopes of recovery. Treatment should be begun before the diagnosis is made by the discovery of sugar in the urine. The author has investigated the diagnostic value of alimentary glycosuria in such cases. In fifteen adipose individuals no trace of sugar could be found when food containing much carbohydrate material was administered, but when pure grape-sugar was taken glycosuria was noted in four cases. Two of these four cases have since developed diabetes, and the two other cases have not been under observation long enough. If subsequent investigation confirm these observations the test with grape-sugar will be of considerable diagnostic value. It should be tried in the adipose and gouty, especially when a family history of diabetes is present. The author looks upon adiposity as frequently an early symptom of diabetes.

Galliard³¹_{Sept. 26, '94} insists on the possibility of mistaking diabetes for cardiac or Bright's disease. He reports a new case of this kind in a woman, aged 35 years, who had all the appearances of cardiac disease in the stage of asystole,—cyanosis, intense dyspnoea, œdema of the lower limbs, smallness of pulse, tumefaction of the liver,—but no appreciable trouble of the heart and no albuminuria. The acetonuric odor of the breath and urine led to the suspicion of diabetes,—a suspicion confirmed by analysis. In spite of treatment the patient soon died from asphyxia with diabetic coma. Post-mortem examination showed the integrity of the heart, pancreas, kidneys and spleen; the liver was increased in size, slightly fatty and cirrhotic, unpigmented; there was commencing epithelioma of the uterine cervix. The author states that besides the comatose form of diabetic acetonaemia there is a syncopal form and a pseudo-asystolic or asphyxic form. Hence, when a patient is suffering from anasarca, or even localized œdema, and, albuminuria being

absent, there is no lesion to explain the condition, diabetes mellitus must be thought of.

Bazy,¹⁰⁰_{Nov. 29, '94} to whom belongs the merit of first calling attention to the subject, returns to the discussion of the errors in diagnosis daily committed on account of the failure to examine the urine for sugar. Garel, of Lyons,²⁰⁷⁵_{'94} claims to have discovered a hitherto unrecorded physical sign which is almost pathognomonic of either diabetes or albuminuria. He states that many patients complain of a slight irritation of the throat,—some difficulty of deglutition, a sensation of swelling, and constriction of the fauces. The soft palate, its pillars, and the posterior wall of the pharynx are found to be red and swollen, and frequently covered with a more or less viscid layer of mucus. In the majority of such cases examination of the urine reveals the presence of either glucose or albumin. Most of these patients present only quite insignificant general symptoms; so that Garel's discovery, if it be confirmed, is of considerable value. Of 21 individuals affected with this particular form of pharyngitis, 10 had diabetes and 11 albuminuria, and in 3 of the cases sugar and albumin alternated in the urine.

Grube⁷⁵_{p. 5, '95} reports 3 cases in which the diagnosis was doubtful between tabes with glycosuria and diabetes. Wegeli¹⁵⁸_{B. 19, H. 1, 2, '95} confirms the gravity of the prognosis of diabetes in children,—a fact well known. Of 108 cases, 69, or 64 per cent., terminated fatally. The prognosis is the graver as the children are younger, the greatest number of deaths being between the ages of 4 and 5 years (20 out of 29 cases). Worms¹⁰_{July 23, '95} claims that in the adult the proportion of grave cases does not exceed 5 per 1000.

Treatment.

Pancreatic Grafting.—Watson Williams⁸⁰_{Oct., '94} records an interesting experiment which, though unsuccessful, is yet not discouraging, the case being certainly in too advanced a stage of the disease when the operation was performed. The patient being placed under an anæsthetic, the pancreas was removed from a freshly-killed calf and three fragments inserted under the skin of the abdomen and chest. Two days later the wounds appeared to have healed by first intention, but the patient fell into coma. At the autopsy the grafts appeared to have taken perfectly.

Ingestion of Pancreas.—As regards the treatment of diabetes by fresh pancreas or pancreas extracts, we have only failures to record. Goldscheider⁶⁹_{p. 376, '94} treated six cases without success by the extract; Watson Williams⁸⁰_{Oct., '94} treated three with but negative results; Amiotti⁹⁹⁷_{No. 36, '94} could see no effect in cases treated by him.

[These negative results are not surprising. I have for some

years maintained that the glycolytic ferment existed in but small quantities in the pancreas; it is formed there, but is immediately removed by the circulation. This is not by any means extraordinary. From Heidenhain's researches it is known that trypsin is not found in the fresh pancreas, but requires several hours for its development at the expense of a zymogen. I have endeavored to determine the zymogen which gives rise to the glycolytic ferment and have succeeded. (See "Pathogeny.") I have attempted to make a practical application of this discovery by giving as a drink to diabetic patients glycolytic ferment obtained artificially by treating by diluted sulphuric acid (at 1 per 1000) 5 grammes ($1\frac{1}{4}$ drachms) of amylate dissolved in 1 litre (quart) of water or beef-pancreas, to which 2 parts of acidulated water have been added. Naturally the solution is neutralized. The results in four cases were quite marked, although the ferment, obtained by a method which requires to be perfected, is not of great strength. The first case was that of a woman 64 years of age, very thin and suffering from sciatic neuralgia. She passed 2 litres 300 grammes ($2\frac{1}{8}$ quarts) of urine in twenty-four hours, containing 100 to 150 grammes ($3\frac{1}{4}$ to $4\frac{3}{4}$ ounces) of sugar. Under the influence of various treatments the sugar was brought to 100 grammes ($3\frac{1}{4}$ ounces). She was given 1 litre (quart) of the solution of ferment, and the sugar fell to 70 grammes ($2\frac{1}{4}$ ounces); it was discontinued and the sugar rose to 131 grammes ($4\frac{1}{5}$ ounces); administered again, the sugar fell to 81 grammes ($2\frac{1}{2}$ ounces). The second case was a corpulent man, who passed as much as 6 litres (quarts) of urine. Before treatment there were 41 grammes ($1\frac{1}{4}$ ounces) of sugar, and after the ingestion of 100 grammes ($3\frac{1}{4}$ ounces) of glucose 50 grammes ($1\frac{1}{2}$ ounces) of sugar. During the treatment by the ferment the sugar fell to 11 grains ($2\frac{3}{4}$ drachms). The third case was a woman, 48 years old, who before treatment passed 116 grammes ($3\frac{3}{4}$ ounces) of sugar, and during the treatment 80 grammes ($2\frac{1}{2}$ ounces). The fourth case, a woman 47 years old, passed before treatment 257 grammes ($8\frac{1}{4}$ ounces) of sugar; during the first days of treatment 124 grammes (4 ounces), the last days 163 grammes ($5\frac{1}{4}$ ounces), and after the suppression of treatment 262 grammes ($8\frac{1}{8}$ ounces). The results are sufficiently demonstrative, though but temporary. Besides, I have never thought of treating cases exclusively by the glycolytic ferment, which agent responds only to an indication,—diminished glycolysis,—which I have noted in diabetic patients; but there are other essential elements of the disease, which must also be treated if good results be desired.—R. L.]

Cassâet, of Bordeaux, ³_{Aug. 21, '95} has had good results with beer-

yeast, administered in doses of 50 grammes ($1\frac{1}{2}$ ounces) at the three principal meals; but account must be taken of a very fetid diarrhoea with gas, which appears on the second day of treatment. According to the author tolerance is established, the general condition improves, and the weight increases.

Wilmaers,⁴⁵⁴_{June, '95} has also treated a case with beer-yeast during a period of sixteen days, and concludes that, in doses of three tablespoonfuls daily in a little beer at meal-time, it is well borne. Fresh yeast should always be employed. In his patient he observed an improvement from the second day, the quantity of urine diminishing as well as the total of the sugar and urea. The specific gravity was not altered and the proportion of sugar to the litre remained unchanged. The improvement from continuation of the treatment remained stationary, and nothing more could apparently be hoped for in the case under consideration. The general condition was not much modified, but the emaciation made no further progress.

Medicinal Treatment.—Samuel West,²_{Aug. 24, '95} praises the use of nitrate of uranium, and reports three cases in which small doses (up to 15 grains—1 gramme) of the drug caused a diminution in the quantity of urine and the percentage of sugar. However, it must be remembered that uranium is a violent poison, and that its prolonged use may not be without inconvenience.

T. Clemens,³_{p. 42, '04} claims to have obtained excellent results in diabetes from the administration of guaiacol in doses of from 6 to 10 drops, three times daily, in a tablespoonful of milk or codliver-oil. This treatment was always well tolerated, it is said, and produced, in the majority of cases, a progressive diminution of glycosuria and polyuria,—sometimes even a perfect disappearance of the same and a manifest improvement of the patient's general condition.

Grube,³⁴_{No. 21, '95} treated a patient for a severe form of diabetes without result. Upon the advice of another diabetic, the patient took daily, for a long period, a coffeespoonful of pulverized eggshells, and was much improved. Although the sugar excretion continued, the body-weight and strength increased. Grube then employed this remedy, in the form of a mixture of phosphate and carbonate of lime, in two other cases. In one case death occurred from an intercurrent affection, in the other a decided improvement in all of the symptoms, and also in a diabetic cataract was observed, though the excretion of sugar was not influenced. Grube would explain the therapeutic action upon the basis of the researches of numerous authors in cases of diabetes, which have shown that an increased excretion of lime occurs in this disease

and that the supply of lime in the food furnished the patients is diminished.

Dietetic Treatment.—Hirschfeld⁴_{Feb. 4, '95} discusses the question as to when alcohol in moderate quantity should be allowed and when altogether prohibited. The author does not agree with the view that alcohol may be an etiological factor in the production of diabetes. In cases of diabetes closely investigated he found that the addition of a small quantity of alcohol (30 to 70 grammes—1 to 2¼ ounces—per diem) had no ill effect. The quantity of nitrogen in the urine was only temporarily increased. With the use of alcohol more fats could be taken, and hence the increased feeding is made more easy. In two cases with some albuminuria the addition of alcohol led to no increase in the albumin, but in one case the opposite fact was noticed. The sugar was noted at the beginning sometimes to be diminished, at other times to be increased; but the original level was arrived at later. No change was noted in the acetonuria. In cases where there is already cardiac weakness or vascular disease alcohol should be used cautiously. There is no danger of increasing the polyuria. Alcohol is a foodstuff, and yet it may possibly injure the heart, vessels, or kidneys. Cases are then given illustrating the different points in treatment. Beer is forbidden, as it contains the most extractive matters, which are chiefly carbohydrates. If a certain amount of these latter are to be allowed they are much better given in bread and vegetables. All sugar-containing liqueurs and sweet wines are, of course, forbidden. Wine, cognac, certain forms of brandy, etc., may be allowed. The author concludes that 30 to 70 grammes (1 to 2¼ ounces) of alcohol are thoroughly consumed in the body in these cases, that it does not interfere with the secretion of the urine or the absorption of food, and that metabolism is only temporarily increased. The general nutrition, however, is improved. Alcohol has no definite action on the tissue-changes peculiar to diabetes. The state of the heart, vessels, and kidneys should be borne in mind. The use of alcohol is only necessary in severe cases in order to ward off, as much as possible, by overfeeding the falling off in strength and the development of tuberculosis.

Williamson²_{Apr. 27, '95} recommends as a diabetic bread a biscuit consisting of a combination of aleuronat and cocoa-nut powder. Aleuronat is a flour (a yellowish powder) which contains 80 to 90 per cent. of vegetable albumin and only 7 per cent. of carbohydrates. The preparation of diabetic food from aleuronat presents considerable difficulties, however. In order to use it for diabetic bread it is necessary to add a considerable amount of ordinary starch-containing flour, and the value of such bread is greatly di-

minated thereby. He found, however, that, by a simple combination of aleuronat and desiccated cocoa-nut powder, cakes can be very easily prepared. Cocoa-nut contains a large percentage of fatty matter (70 per cent.); a small quantity of sugar is also present, but this can be almost entirely removed by fermentation.

For the preparation of these cakes 2 ounces (62 grammes) of desiccated cocoa-nut powder are mixed with a little water containing a small quantity of German yeast. The mass is then formed into a kind of paste, and this is kept for half an hour or longer in a warm place. The small amount of sugar contained in the cocoa-nut is almost entirely decomposed by the fermentation produced by the yeast, and the cocoa-nut paste becomes spongy. Two ounces (62 grammes) of aleuronat, one egg beaten up, and a small quantity of water in which a little saccharin has been dissolved are now added to the cocoa-nut and the whole well mixed until a dough is formed. This is divided into cakes, which are baked in a moderate oven for twenty or thirty minutes.

Stern ^{June 8, '95} recommends the use of the kernel of the pea-nut (*Arachis hypogæa*) as a food for diabetic patients. The average of all available analyses shows that it contains 29 per cent. of proteids, 49 per cent. of fat, and 14 per cent. of carbohydrates in the dry material. The oil is extracted on a large scale in European countries, and utilized as a substitute for olive-oil for lubricating purposes and in the manufacture of soap. The meal contains about 52 per cent. of proteids, 8 per cent. of fat, and 27 per cent. of carbohydrates.

The author points out that the pea-nut is one of the cheapest foodstuffs known to us; it contains a large amount of nitrogenous and fatty matter and little carbohydrates. Directions are given for the preparation of a "diabetic pea-nut flour." The pea-nut kernels are boiled in water for half an hour to extract a portion of the oil which they contain. The kernels are then dried and pounded into fine particles by a rolling-pin. The pounded kernels are then placed in boiling water, acidulated with tartaric acid or vinegar, in order (1) to extract saccharine elements; (2) to overcome the smell and taste of the pea-nut; (3) to prevent emulsification of the remaining oil. After having undergone a thorough boiling with acidulated water, the ground kernels are subjected to dry heat and then rolled into fine flour. The flour may be used in the form of porridge, with milk; bread and biscuits can be baked from it; but the nicest and most easily digestible form in which it can be utilized is the German pancake. The author begins with 15 grammes ($3\frac{3}{4}$ drachms) of the flour daily, and gradually increases it up to 25 grammes ($6\frac{1}{2}$ drachms) daily in the sec-

ond week, 35 grammes ($1\frac{1}{4}$ ounces) daily in the third week, and so forth.

Hale White⁴²⁸_{V.4,p.133,'94} records the result of a number of careful experiments on eight diabetic patients with regard to the effect of giving levulose and inulin. Levulose prepared by von Schering was employed, and inulin in the form of dahlia-tubers was given. The following are the conclusions at which he arrives: 1. If large amounts of levulose are given, some of it appears in the urine. 2. In none of these cases did levulose have the pernicious effect—often seen with ordinary carbohydrates—of increasing the output of sugar beyond the extra quantity given. 3. When levulose is given the excretion of sugar is usually increased, but it may be diminished. 4. In most cases much less sugar is passed in the urine after giving levulose than would have been excreted if the previous excretion of sugar had remained stationary and all the levulose had appeared in the urine. This result seems to indicate that in these cases some of the levulose given was retained and used up in the body. 5. There is some evidence that the larger the amount of levulose, the less will be the increase of sugar in the urine. 6. While, therefore, some of these cases show that levulose can be utilized better than dextrose, none of them show that dextrose can be utilized better than levulose. 7. None of the patients felt worse for taking levulose; indeed, some felt better and gained in weight. 8. Probably a moderate amount of dahlia-tubers, taken as a vegetable by patients suffering from diabetes, would do no harm. 9. The effect of levulose on the excretion of urea is unimportant. 10. The amount of urine passed when levulose is given varies with the quantity of sugar passed.

K. Grube¹¹⁴_{B.26,H.3,4} records the results of observations on the effect of giving levulose in seven cases of diabetes, of which six were slight forms of the disease. From these observations the author concludes that levulose can be given in moderate quantities in the so-called slight forms of diabetes without any injurious results as regards sugar excretion, state of the urine, etc. These patients appear to have been able to utilize the levulose in the system, though dextrose and cane-sugar were excreted, unutilized, in the urine.

Haycraft,⁹⁰_{Sept., '94} from experiments on rabbits and observations made on three patients with diabetes to whom levulose was administered, draws the following conclusions: 1. A patient suffering from chronic diabetes can utilize 50 grammes ($1\frac{1}{2}$ ounces) or more of levulose daily. 2. In some acute cases a part of the levulose taken with the food is excreted as such, a part is utilized in the body, and a part is transformed into glucose. 3. In rabbits

glycogen is formed from the levulose taken and is stored up in the liver.

Palma⁴⁰⁵_{B.15,p.265} has confirmed, at the clinic of von Jaksch, these assertions of Haycraft as to the administration of levulose in diabetes. One hundred grammes ($3\frac{1}{4}$ ounces) led to more or less diuresis in five cases, and to an increased excretion of glucose. On an average, 8 grammes (2 drachms) of levulose pass by the urine; 30 grammes (1 ounce), even in grave cases, are retained in the economy; 100 grammes ($3\frac{1}{4}$ ounces) of maltose lead to an increase of from 60 to 100 grammes ($1\frac{3}{4}$ to $3\frac{1}{4}$ ounces) of glucose and there is no maltose in the urine. Bohland¹¹⁶_{p.377,104} observed an increased excretion of glucose in man after the administration of levulose.

[It appears, in short, from numerous researches on the subject, that levulose may generally be given in small doses to patients suffering from mild diabetes, but that if a small daily dose be exceeded the excretion of sugar is increased without any benefit to the patient.—R. L.]

Treatment of Complications.—Grube, of Neuenahr,³⁴_{May 21, '95} calls attention to a form of crisis which appears spontaneously without prodromes, while the patient is feeling relatively well, and which may last for days or for hours; and after the cessation of the acute attacks there is still present a great amount of weakness. The attacks come on in the morning with violent abdominal pain, most marked in the epigastric region, with flatulence and eructation. Oftentimes this is followed by nausea and vomiting. At the same time the patient has cramps in the legs, dryness of the mouth, a slight elevation of temperature, and an acceleration of the pulse. The urine contains, besides sugar, acetone, but does not show a reaction with diacetic acid and does not contain oxybutyric acid. The chloroform odor is very pronounced.

This author recommends in these cases the provoking of a stool, either by purgative water or oil enema, and the application of hot compresses to the abdomen. All medicines given by the mouth are vomited. During the crisis the patient can take nothing. Later he can take bouillon of fowl, milk, tea, or water with brandy. The vomited matters are non-digested food; they are acid in reaction and seem to contain a large amount of hydrochloric acid.

Legendre,²⁰⁰⁰_{'95} in discussing surgical operations in diabetes, states that no minor operation should be done to please the patient, only urgency warranting surgical intervention. The essential condition of success is asepsis, antiseptics being frequently badly borne in these cases.

Jacobson¹⁰⁰_{Aug. 24, '95} says that, in the treatment of albuminuria in diabetics, it is important to bear in mind that the maintenance of the patient's strength is of more importance than the loss of more or less albumin or sugar. In the slight form of albuminuria the general condition is good and the case must be treated as an ordinary case of diabetes. The strong alcoholic drinks must be prohibited and only the light wines or beer allowed. If the patient be arthritic, alkalies, lithium salts, and arsenic may be given. Moderate muscular exercise, massage, the douche, and cutaneous friction are of service. In the grave forms of albuminuria symptoms of Bright's disease are present and the kidneys are affected. But the milk diet so frequently employed in Bright's disease ought not to be prescribed, as the glycosuria and polyuria would thereby be increased. Neither ought the ordinary treatment of diabetes to be employed, for nitrogenous substances are injurious in Bright's disease, and there would be the risk of causing uræmic symptoms. Hence a mixed diet is to be recommended. Alcohol should be strictly forbidden. Sometimes the iodides and phosphate of lime are of service. Opium, belladonna, and antipyrin have been prescribed. When the albumin replaces the sugar in the urine, the case may be treated as one of Bright's disease.

Oliver⁶_{Oct. 27, '94} relates a new case of saline infusion for diabetic coma. The improvement was but temporary. Klemperer¹¹⁵³_{June 19, '95} also notes the absolute failure of alkaline medication in twenty-one cases of comatose diabetes which he has carefully studied from this stand-point. He believes that the increased excretion of acids is due to as yet unknown toxic agents, for, as appears from another series of experiments upon the exchanges in diabetic coma, there is considerable decomposition of albumin; and it is to be noted that affections in which such decomposition of albumin is observed also terminate in coma, and that apart from any increased excretion of acids.

FEVERS.

BY THE CENTRAL EDITORIAL STAFF.

SUBMITTED FOR COMMENTATION TO

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General Considerations.

SHOULD fever be considered as a pernicious feature of the diseases in which it presents itself or as one of the means employed by nature to antagonize the destructive action of infectious processes? After a series of carefully conducted experiments Loewy and Richter⁶⁹_{No. 16, p. 240, '96} reached the conclusion that fever and leucocytosis should be regarded as of assistance to the system in combating the effects of infection, and they suggest that therapeutic benefit may be derived from the use of means tending to increase these conditions rather than from those calculated to antagonize them. By means of the Sachs-Aronsohn method of puncture of the corpus striatum they were able to induce in rabbits a fever of more or less intensity and of the continued remittent type. When inoculated with virulent cultures of the bacilli of diphtheria, chicken-cholera, swine-plague, and pneumonia, the animals were much less affected than others similarly inoculated in which fever had not been induced. In one hundred experiments in which the fatal dose of chicken-cholera, diphtheria, and pneumonia was used, there was much slower progress of the disease in the febrile animals and in the cases in which only two or three times the fatal dose was administered the febrile animals recovered. To ascertain the effects of an increased number of leucocytes upon the course of various infections in animals, Loewy and Richter induced artificial leucocytosis by injecting pilocarpine, spermin, and various albumoses. Animals so treated were resistant to three and four times the fatal dose of the pneumococcus, there being only slight rise of temperature and insignificant symptoms in the cases in which the leucocytosis existed at the time of the inoculation. When the pneumococcic infection was allowed to proceed for twenty-four hours before the induction of leucocytosis there

was a greater mortality, though even then benefit seemed to result from its induction.

[The leucocytosis produced by fever materially aids the patient to throw off the infective cause. The practical question which confronts the physician at the bedside, however, is not the abolition of pyrexia, which he knows is impossible, but to what extent it should be controlled.—J. D.]

L. Krehl ²⁷³_{B.35, Nos. 2, 3} examined into the nature and origin of fever-producing substances of bacteria, with especial reference to the question as to whether all species of bacteria produce fever, whether they do it in all animals, or whether the pyretic action of a micro-organism in a certain species of animal is directly connected with its pathogenic properties.

The author reached the conclusion that the fever-producing substance obtained from the same species of bacteria acts variously in different animals. The temperature of some remains unaltered or but slightly elevated; in others a high fever is produced. Still, there appears to be no definite relation existing between the production of fever in a species of animal with sterile products of a micro-organism and the pathogenic qualities of the bacterium for the species of animal in question. For example, dead diphtheria bacilli manifested no, or very slight, action in dogs, rabbits, and guinea-pigs; dead anthrax bacilli are not capable of producing fever in dogs, although this organism is particularly pathogenic for dogs and produces in them an infection accompanied by high fever. On the other hand, the wholly innocuous bacillus subtilis elevates the temperature of the dog in no slight degree.

Janssen ³²⁶_{B.53, '94; Dec. 15, '94} ² studied the causes of subnormal temperature in four hundred cases and found that a very low temperature may present itself: 1. After the direct withdrawal of heat from the body, as in cases of exposure, of unconscious or drunken persons in a very cold atmosphere, or after immersion in very cold water. 2. After the loss of great quantities of fluids from the body, as in severe diarrhœa, enteritis, cholera, or profuse hæmorrhage. 3. In conditions of cachexia and inanition, such as cancer of various parts of the alimentary canal, severe forms of diabetes, pernicious anæmia; during convalescence from febrile affections, and in many chronic mental diseases. 4. In grave circulatory disturbances, as in cardiac failure. 5. In various diseases of the central nervous system, in tuberculous meningitis, at the onset of cerebral hæmorrhage and embolism, in some cases of brain-tumor, and in general paralysis of the insane. 6. After irritation of sensory nerves, as in intestinal strangulation, in renal and gall-stone colic, internal perforations of the intestines, etc., and after surgical operations. 7.

In extensive skin affections, such as scleroderma and extensive burns. 8. After fevers, when the temperature may long remain subnormal; or in the course of certain fevers, as in pyæmia. 9. In cases of poisoning by phosphorus, atropine, morphine, carbolic acid, and in alcoholic intoxication; also in the auto-intoxication of uræmia, and in diabetic coma. In some healthy persons subnormal temperatures are occasionally observed without any apparent cause. Numerous examples of very low temperatures in the above-mentioned diseases are given in the original, and Janssen concludes that subnormal temperatures occur much more frequently than is generally supposed, and that a depression under 33° C. (91.4° F.) is by no means rare. The facts brought forward by the author also show that low temperatures *per se* are not grave prognostic indications. Very low temperatures may occur without any symptoms of collapse, and in severe collapse the temperature may be normal. Subnormal temperatures are unfavorable prognostic indications, especially when they occur and persist in cachectic patients.

[The temperature in pernicious anæmia is usually at or about normal, interrupted at irregular intervals by a moderate irregular fever of uncertain duration,—usually two weeks or less. The occurrence of subnormal temperature is uncommon.—J. D.]

Typhoid Fever.

Pathology.—G. E. Klein, of London, ²²_{Oct. 10, '94} has during the last three years examined the mesenteric glands and spleen of a considerable number of persons dying in the course of typhoid fever between the twelfth and twenty-fifth day, and has never failed to find the specific bacillus of typhoid fever in considerable numbers, either by microscopical examination or by cultures. The spleen particularly contained the microbe in very large numbers, and on cultivation yielded crowds of colonies of this bacillus in pure cultivation. He shows the essential differences between it and the bacillus coli to be as follows: 1. The typhoid bacillus is distinctly more cylindrical than the bacillus coli, its average length being twice or three times as great. 2. Its motility is decidedly greater, each bacillus being surrounded by numerous flagella. 3. It grows less quickly than the bacillus coli on the surface and in the depths of nutrient gelatin, as also in gelatin plates. 4. When growing on the surface of gelatin, either in tubes or in plates, it forms a peculiar iridescence which is not observed on similar culture of the bacillus coli. 5. It does not form gas-bubbles in gelatin shake cultures. 6. It does not curdle milk. 7. It grows well in broth, but does not form indol. 8. It grows well in 25-per-cent. gelatin,

but, unlike bacillus coli, makes the gelatin uniformly turbid in as short a time as after twenty-four hours. From a superficial examination of the cultures it would be difficult to say whether these colonies are those of bacillus coli or typhoid bacillus, or of both, but on more careful examination it is seen that some of the surface colonies are less translucent and considerably larger than others, and that they possess a more irregular outline than others. Now, on making microscopical specimens of these large colonies, it will be seen that they are mostly short, oval rods, among which few only show active motility, whereas preparations made of the small, translucent, surface colonies show longer, cylindrical bacilli and filaments possessed of vigorous and brisk motility. By making of the two kinds of colonies subcultures in gelatin shake cultures, in milk and in broth, it becomes soon apparent that they represent two definite species; and if from such subcultures further subcultures are made, through however many generations, the differences just enumerated of the two species will appear to be constant and permanent. (See "Bacteriology," vol. ii, section J.)

Sanarelli⁴⁰_{Feb., '95} finds that both anatomical lesions and symptoms are the same, whether resulting from infection by the microbe or intoxication by its products. After a series of experiments the author concludes that: 1. Eberth's bacillus, having penetrated the organism, fabricates a toxin which acts on the nervous system and brings about death by collapse. 2. In addition to general toxic effects, this toxin acts peculiarly on the mucous membranes, especially of the intestine, and thus brings about the familiar lesions. 3. All these anatomical alterations produced by the toxin, and independently of the virus, are accompanied by symptoms presenting very close analogies with those of human typhoid. 4. In experimental, as in human, typhoid Eberth's bacillus is not found in the intestinal contents; this fact militates against the idea that the disease is a process infectious in origin localized in the intestine. 5. This absence of Eberth's bacillus in the intestine is to be explained by two circumstances,—first, because typhoid fever is an infection of the lymphatic system only; secondly, because, directly the poison begins to act on the intestinal walls, the bacillus coli becomes pathogenic and increases so enormously as to assimilate all other forms. 6. Given the grave toxic anatomical alteration of the intestinal mucous membrane, the bacillus coli constitutes the first cause of the secondary infections and localizations so frequent in the disease. 7. If the animal is partially vaccinated, bacillus coli emigrating from the intestine produces only local effects. 8. Animals vaccinated against Eberth's bacillus are also vaccinated against the bacillus coli, which, there-

fore, tends to disappear from the intestine, being probably destroyed by the epithelial cells of the mucous membrane, which thus act toward it like all other phagocyte cells of the vaccinated organism.

Wathelet ²⁶²_{Apr., '95} ¹¹²_{Nov.} made cultures from the dejecta of twelve cases of typical typhoid fever, examining fifty-one specimens of feces. Of six hundred colonies studied, the bacillus of Eberth was found in only ten. In eight patients the bacillus was never present in the fecal discharges. The bacillus coli was nearly always present. The rarity of the typhoid bacillus in the intestine is strange, when we reflect that it is practically always present in the spleen, while the reverse is true of the bacillus coli. In another series of experiments Wathelet has been able to demonstrate a marked antagonism between the two bacilli: if the two are planted together, even if the quantity of typhoid bacilli is much larger, the medium will, in a few days, be found to contain only bacillus coli. The latter bacillus also grows on the filtered bouillon of a typhoid-fever culture, while the bacillus typhosus not only does not develop in a filtered culture of bacillus coli, but is speedily killed. This seems to accord with the clinical observations. The theory of Sanarelli, here given, best explains the facts, with the exception that it does not elucidate why the bacillus coli is regularly absent from the spleen of the bodies of typhoid-fever patients, when it is so common in a variety of other affections.

J. A. Amyot ³⁹_{Jan., '95} alluding to the fact that very few observers have drawn attention to the pathological changes occurring in the liver during typhoid fever, although marked lesions are frequently found in that organ after death, gives in detail the histological appearances of the liver in seven cases studied by him. Diminutive nodules were observed in all the specimens,—in small numbers in some and in comparatively great numbers in others. They varied from about one-fortieth to one-fiftieth of the size of the lobules and were distributed irregularly. The author divides the nodules into two classes,—the lymphoid and the necrotic. Neither of them seemed to be of new growth. At first they appeared to be alike, but afterward became invaded to a greater or lesser extent by lymphoid cells. The nodules were made up of masses of unstained granular protoplasm. The author's observations sustained Osler's view that no definite relation exists between the typhoid bacillus and these nodules. In some of these masses the nuclei were still visible, though unstained. Some of the nuclei were broken up into several fragments which stained diffusely. The capillaries of the nodules were filled with granular material.

Lymphoid cells were found chiefly in the capillaries, but a few were seen between the hepatic cells. The so-called lymphoid nodules differed from this only in the difficulty with which the formed elements were seen and on account of the great number of lymphoid cells present. They were sharply cut off from the surrounding tissue. Besides these nodules there were present areas of capillary dilatation, with only the nuclei remaining in the hepatic cells. These areas were of varying size and location, but were generally larger than the nodules before described; they were, as a rule, circular in form and were not so sharply marked off from the surrounding tissue as the necrotic nodules; they were present in four of the seven specimens. There was no pigmentation. The other changes were nutmeg change, atrophy, and pigmentation of the hepatic cells, and dilatation of the capillaries in the intra-lobular-vein zone. Fatty degeneration of the cells in the portal-vein zone was present in two of the specimens. Beyond some excess of granulation, there was no change in the protoplasm of the cells.

Dmochowski and Janowski ^{768 15}_{B.17, p.221; Dec., '95} publish an article on the relation of the typhoid bacillus to suppuration. They find that subcutaneous injection of the typhoid bacillus does not cause suppuration in the healthy dog, but that it may in anæmic animals, and also that where there is a local lesion—such as a healed wound—suppuration is easily produced. In the rabbit, on the other hand, suppuration may readily be caused by injections of the organism carried through the tissues of a dog. A certain stage of virulence, however, is necessary. If the virulence be too low only a slight inflammation is produced; if the organism possess too high a toxicity, the animal rapidly dies before local change occurs. They have also found that, when a local lesion is produced beforehand and the organisms are then injected into the peritoneum, they may settle in the place of diminished resistance and produce an abscess. The pus may be of ordinary appearance or may be mixed with blood, and the typhoid bacilli are generally more numerous in the wall of the abscess than in the pus, and may even be absent from the latter. The serous cavities, joints, bone-marrow, etc., have in the normal state a considerable degree of resistance to injections of the bacillus, but suppuration may follow if they have been injured previously. When a local abscess is produced by simultaneous injection of typhoid bacilli and pyogenic cocci, the former disappear from the pus before the latter; so that in clinical cases of suppuration where typhoid bacilli alone are found, it is improbable that ordinary pyogenic organisms were present at an earlier period. Their general con-

clusion is that, given typhoid bacilli of suitable virulence and tissues of diminished resistance, suppuration may be produced by the typhoid bacilli alone. Janowski⁵⁰_{B.17,p.785} also records a case of post-typhoidal suppuration in the parotid, in which only typhoid bacilli could be found.

Fenwick and Bokenham²_{Apr.13,'96} studied the pathological effects of certain chemical substances extracted from the spleen of patients dying during the third week of typhoid fever and came to the following conclusions: 1. Three varieties of chemical substances can be extracted from the spleen after death from enteric fever during the third week of the disease,—albumoses, alkaloids, and fatty bodies. 2. The injection of the albuminous extract into lower animals causes an elevation of the temperature of the body, which lasts for about thirty hours, and is associated with anorexia and emaciation. Under ordinary circumstances a fatal result is not observed, and no pathological changes of importance are to be detected in the tissues. 3. The administration of the alkaloidal and fatty extracts is unattended by any pathological results.

H. W. Freund and E. Levy, of Strassburg,⁴_{June 24,'96} consider the subject of intra-uterine infection in typhoid fever, basing their remarks on the study of a case in which a miscarriage took place in the fifth month of pregnancy and in the fourth week of an attack of typhoid fever diagnosed by the temperature-curve, dicrotic pulse, swollen spleen, roseola, and loose stools. Cultures made from the spleen and heart's blood of the fœtus, and from the placental blood, gave numerous colonies of an organism which proved to be the bacillus of typhoid. Cultures made from the outer surface of the placenta and from the vernix caseosa on the fœtus were sterile. No abnormality was found in the fœtus except a somewhat enlarged and slightly softened spleen. The intestine was normal. The infecting organism, according to the authors, entered the fœtus through the blood, and caused a septicæmia such as has been observed in other cases of intra-uterine transmission of organisms. The characteristic lesions of typhoid may not be found in the fœtus, because the functions of its organs had not yet been established, just as, for a similar reason, pneumonia is not present in cases of intra-uterine infection with the diplococcus pneumoniæ of Fränkel.

Contamination.—E. O. Jordan, of Chicago,⁹_{Sept.28,'96} studied the conditions affecting the behavior of the typhoid bacillus in water. The general results arrived at were the following: (1) the age of the typhoid-fever stock greatly influences the life of the bacilli introduced into water, a freshly isolated stock possessing distinctly greater vitality than one that has been under cultivation for some

months; (2) the typhoid-fever bacillus, when introduced with proper precautions into sterilized Lake Michigan water, does not multiply, but may, under certain conditions, maintain its vitality for upward of ninety-three days; (3) the colon bacillus, on the contrary, under similar conditions, undergoes rapid multiplication and may remain alive for upward of two hundred and sixty-two days; (4) in redistilled water the typhoid-fever bacillus perishes much more speedily than in the water of the lake; (5) the quantity of organic matter (peptone) in redistilled water influences fundamentally the life of the typhoid-fever bacillus, so small an increment as 0.0126 organic nitrogen (part per 100,000) causing a perceptible lengthening of life; (6) in sterilized lake-water the addition of a still smaller quantity of organic nitrogen—0.0012—affects the longevity of the typhoid-fever bacilli introduced.

An interesting point brought out by Klein²_{Oct. 18, '94} is that the addition of nitrates to water materially increases its power to support the typhoid bacillus in a virulent condition. This would appear to explain the long persistence of the typhoid germ at times in water contaminated by sewage or which has percolated through nitrate-containing soil.

In an epidemic of typhoid fever in Stamford, Conn., due to infected milk,⁵⁹_{May 4, '95} it was found that the milkman's barns were in the rear of his lot, and surrounded on all sides by dwellings and outbuildings. His tank for cooling milk was in the northwestern corner of a barn; this was fed by a pump drawing water from a well twelve and one-half feet deep and filled with water to within one and one-half feet of the surface. West of the pump were two outhouses, one twenty feet and the other fifteen feet, each above the level of the bottom of the well. The slope of the land was toward the east, and the drainage from the outhouses led directly toward the pump. The ground was clay, covered with gravel, with surface-soil above. The well-water was examined by Prudden, of New York, and found to be swarming with bacteria. Water taken from two wells to the west of that water-supply and one to the south were found to be contaminated, and the wells were ordered to be closed.

J. Poché²⁴³_{Sept., '94} describes three epidemics of typhoid fever in regiments of French soldiers, in which the origin was clearly shown to be independent of the water-supply and to depend upon the condition of the sewers, the poisonous emanations from which infected the soldiers. Several varieties of the coli bacillus and a microbe resembling the Eberth bacillus were found in the mud of these sewers.

Anderson, of Dundee,²¹³_{Nov., '94} observed two cases of typhoid fever

in which the disease was contracted by the use of a syringe in giving enemata. These patients were in hospital for other diseases and never left their beds until convalescent from typhoid fever. The condition of the wards being perfect and under watchful care, infection in any other way was impossible. An enema of water and soap was given to typhoid patients every second day, and the nurse used the same enema syringe for all the patients in the ward. In this way the specific typhoid virus in the lower bowel of the typhoid patients became attached to the nozzle of the syringe and was introduced into the bowel of the neighboring patients.

Dreschfeld, of Manchester, ²_{Apr. 20, '95} publishes some instances of infection from the ingestion of oysters and other articles of food; the typhoid bacillus in such cases grows very readily, especially on vegetables, and these, by being washed or watered with contaminated water, might contain the germs of fever; insects, also, by coming in contact with contaminated sewage or with typhoid dejecta, might carry the typhoid organism and deposit it on fruit. Family predisposition to typhoid is also studied, and an instance given in which seven members of one family were affected with typhoid within a few weeks. Broadbent ²_{Jan. 12, '95} cites nine cases of typhoid fever in which the disease was communicated by oysters. They were all cases seen in consultation. All of the cases lived where typhoid was not prevalent. The hygienic surroundings were perfect. In all of the cases oysters had been partaken of freely by the patients. (See "Hygiene," vol. iv, section G.)

Constans, of Montpellier, ²_{Feb. 16, '95} having carefully studied the effect of fatigue on the pathogeny of typhoid fever, has come to the conclusion that it is an important factor in the evolution of that disease, and especially so in hot climates.

Ram Kishen, of Amritsar, ²³⁹_{Mar. 1, '95} states that many natives of India suffer from typhoid fever in a mild or severe form at some period of life. The season of greatest activity of the typhoid-fever poison in India is in the dry, hot, summer months, when filth is scattered in fields and collected in heaps near and in villages and towns, and when lanes saturated with liquid animal excreta are freely exposed to the hot rays of the sun. The atmosphere is thus admixed with gases resulting from decomposition, with no natural cleansing process, except the occasional dust-storms, to purify it. Next to the summer months, the poison is active in the dry part of winter; then in the rainy season, and, lastly, in the spring.

P. S. Wise, of Alliance, O., ²²²_{Oct., '94} believes that, while typhoid fever is probably not contagious in the vast majority of cases, or but feebly so, the most malignant forms are as actively contagious

as scarlet fever or diphtheria. If the theory that sewer-gas or foul emanations will cause the disease be true, then it must be concluded that ærial infection is possible, because, if currents of foul air from sewers, etc., will carry the germs with them, there is no reason why they should not float in the air of the sick-room if they are liberated from clothing soiled with the discharges of the sick.

[Existing evidence conclusively proves that typhoid fever is *not* transmitted through the air, but by *direct contact*.—J. D.]

Symptomatology — Intestinal Hæmorrhage. — Molinié and Daunie¹²¹_{Sept., '96} describe a case of typhoid fever in which hæmorrhage from the ears was a conspicuous manifestation.

W. T. Pate, of Gibson's Station, N. C.,⁴⁶_{Sept., '94} cites the case of a family, coming within his personal observation, in which there were 34 cases of typhoid fever within seven years,—15 among males and 19 among females. Intestinal hæmorrhage occurred in 18, or 53 per cent. It was the immediate cause of death in 12 cases, or 33 per cent. The percentage of hæmorrhages was the same for both sexes. All ages, from infancy to 42 years, suffered alike. The hæmorrhage occurred on the first day of the fourth week in 2 cases, during the third week in 14 cases, and during the second week in 2 cases. In all cases the blood lost was considerable, and in those in which the hæmorrhage was the immediate cause of death it was sudden, free, and quite profuse. There was no hæmophilic tendency in the family. Long, Fox, and Sykes, in the discussion, stated that they had observed similar family predispositions.

Achard,¹⁷_{Sept. 27, '94} in a lecture at the Cochin Hospital upon this subject, stated that, when intestinal hæmorrhage appeared at the beginning of typhoid fever, the prognosis was always grave; when it occurred during the typhoid state and was of moderate intensity, it did not compromise the possibility of recovery, and even sometimes exercised a restraining effect upon the nervous symptoms; in such cases Trousseau considered the hæmorrhage as of good import. When occurring late in the disease, it indicated atonic ulceration causing weakening of the patient by preventing proper alimentation, and might give rise to a most serious complication, —namely, perforation.

[It is well known that intestinal hæmorrhage occurring in the beginning of typhoid fever does not always make the prognosis grave. Many cases recover after running an uneventful course.—J. D.]

Eruption.—G. Singer, of Vienna,⁶_{Dec. 22, '94} calls attention to the fact that in some cases of typhoid fever the roseolar may be re-

placed by a papular eruption. He has observed this at the Vienna General Hospital in twelve instances, in two of which the bacillus of typhoid fever was found on microscopical examination of the infiltrated cutaneous follicles, and cultures of the bacillus could be obtained. No positive result was yielded by bacteriological examination of the blood of these patients. Singer is of the opinion that in doubtful cases it may be possible to base the diagnosis of typhoid fever on a bacteriological examination of the cutaneous eruption.

[The writer has observed in the same hospital a case of typhoid fever in which the roseola was replaced by numerous small petechiæ. The case terminated fatally in forty-eight hours.—J. D.]

A. V. M. Anderson, of Melbourne, Australia, ²⁸⁵_{Aug. 20, '94} remarks that blue spots are seldom seen in the course of typhoid fever, and probably escape observation in a number of cases because of this indistinctness. The blue rash seems to have been originally observed by the French physicians. Trousseau noticed its frequent occurrence in mild cases, but could not say whether it was a mere coincidence or whether the blue spots were characteristic of a mild form of the disease. Tanner mentioned them as faint bluish stains on the abdomen. Austin Flint called them bluish patches of irregular form, from three to eight lines in diameter, occurring on the abdomen, back, and thighs, and thought they were more likely to be found in mild than in severe cases. The author noticed blue spots in eight out of nine hundred and fifteen cases. In five of them they were present when the patient was admitted into the hospital, the duration of the disease before admission varying from five to fifteen days. In other cases they appeared several days after,—on the fifteenth, twenty-first, and forty-second days, respectively. Regarding the nature of these spots, the author could see no evidence of the presence of pediculi. The rash did not occur in patients who were specially dirty. There was no sign of the insect itself, and there was an utter absence of the irritation and characteristic eruption due to the parasite. The marks were subcutaneous, and in three cases developed several days after the patient's admission to the hospital and under circumstances where the strictest cleanliness was observed.

Urine.—Baart de la Faille, ²¹⁶⁵_{'96} after an investigation of the subject, concludes that bacteriological examination of the urine suspected of typhoid fever may aid the diagnosis, though the probability of establishing it by this alone is small. No relationship was found to obtain between the numbers of bacteria and the amount of albumin. The author finds that a number of bacilli,

including *bacillus lactis aërogenes* and *bacillus acidi lactici*, are identical with, or only varieties of, *bacillus coli communis*.

Louis Lecocq ^{212 673}_{June 25, '96; Aug.} states that albumin appearing at the end of the first or beginning of the second week is scanty and lasts but a few days, influencing in no way the progress of the fever. When albuminuria appears late, however, it is a graver symptom; in the third or fourth week it announces that the kidney is affected and no longer properly performs its functions, and that the toxic principles of the fever can no longer be eliminated with ease. Uræmia is here to be feared, and in the author's own cases the mortality, where late albuminuria appeared, was 66 per cent. However, the nephritis must not of necessity be considered as the cause of the gravity of the disease, but as being always one of the symptoms, and sometimes the only symptom, of this gravity. The quantity of albumin in the urine cannot aid in the prognosis; for while certain patients, excreting 0.4 gramme (6 grains) per litre (quart), die, others, excreting 2.5 grammes (38½ grains) per litre during a long period, recover. On the other hand, the quantity of urine indicates the gravity in a certain manner. If the amount diminish and but a few hundred grammes are eliminated, the patient will die; if he continue to urinate freely, or the quantity increase, the chances of recovery are good. The author finds in this fact an indication for the cold bath as being the most powerful diuretic, and, therefore, the treatment of choice.

Roth ³⁴_{Mar. 12, '96} cites a number of statistics in relation to the frequency of nephritis as a complication of typhoid fever. He mentions the observations of Mygge, who, systematically examining the urine of 72 typhoid-fever patients, found albumin present in 52. In half of these cases it was due to nephritis, in the other half to pyelitis or to cystitis. He refers particularly to cases in which the renal symptoms may be much more marked than those referable to the gastro-intestinal tract, and cites the case of a boy taken suddenly ill with headache, thirst, fever, and pain in the right loin. On admission, on the fourth day of the disease, the urine was scanty, dark red, cloudy, contained considerable albumin, epithelial cells, numerous white blood-corpuscles; no casts. On the eighth day roseola were found; on the ninth day the spleen was palpable; the urine contained albumin and epithelial cells from the pelvis of the kidney; no casts. The disease thus began as a pyelitis, it being only on the eighth day that the diagnosis of typhoid fever could be made. The constant absence of casts argued against nephritis. The patient recovered.

After an examination of 243 specimens of urine William J. M. Ettles ⁹⁰¹_{July 20, '96} concludes that Ehrlich's diazo-reaction is found in

the urine of a certain number of apparently healthy individuals, —2 out of 85 cases,—and invariably in typhoid fever and pneumonia. It is very frequently found in pleurisy,—12 out of 13 cases; in measles, 8 out of 16 cases; and in intestinal obstruction, 1 out of 2 cases. Frequently in peritonitis, 2 out of 5 cases; in suppurative inflammation, 4 out of 16 cases; in erysipelas, 3 out of 7 cases; and in phthisis, 5 out of 21 cases. It is occasionally observed in rachitis, 3 out of 14 cases, and in diabetes mellitus, 2 out of 17 cases. It seems to be absent in malignant and chronic, non-tuberculous, visceral lesions. When taken in connection with other symptoms it has a diagnostic importance. Where we are suspicious of typhoid fever its presence would be suggested and it would help differentiate tuberculous phthisis from other chronic pulmonary diseases. These results agree with Nissen's deductions.

After performing over one thousand tests S. Herbert Perry believes that the color-reaction is not reliable.³² Positive evidence is the blue-green precipitate. In some cases the blue-green precipitate followed when no positive evidence could be gathered from the red coloration. The complete reaction is present in typhoid fever, but certainly not in most other febrile states. In the following table the diazo-reaction means the blue-green precipitate:—

Disease.	Number of Cases.	Number Giving Diazo-Reaction.
Typhoid,	25	20
Acute croupous pneumonia,	15	
Influenza,	10	
Pulmonary tuberculosis,	15	1 (slight)
Acute rheumatism,	15	

In cases of acute and chronic nephritis, scarlet fever, sarcoma, and carcinoma there was no reaction. In ten cases of influenza of the gastric type, which may closely simulate typhoid, the reaction was not present. Next to typhoid, it is agreed that in pulmonary tuberculosis the diazo-reaction is most often met with. In typhoid the reaction is commonly present, and lasts for several days. In other fevers it is rarely present, and then for a day only. There is some doubt about the time the reaction first appears; it may be present while the temperature is rising in the first week, but it is commonly present during the second week, and may be absent after this. During a severe relapse the reaction re-appears. The duration of the reaction averaged in the above twenty cases was ten days.

Indican, the potassium salt of indoxyl-sulphuric acid, is present in the urine of typhoids, to a marked extent, from the beginning to the end of the disease. It is probably the latest of

all conditions to clear up. Indol is the result of putrefactive pancreatic digestion. In experimental pancreatic digestion the formation of indol can be prevented by the addition of thymol or salicylic acid. Typhoid urine in the febrile stage is dark brown in color,—a state usually attributed to indican, but really due to higher oxidation products of indol. In using Jaffe's test for indican it is not unusual to get a reddish-violet coloration, due to the reaction of skatoxyl products. The administration, however, of salol, turpentine, and chlorine solution had no effect on the excretion of indican. The most indican was found in cases of typhoid associated with constipation, which, *a priori*, would be expected. It seemed that excessive indicanuria might have some connection with the anæmia which sometimes follows typhoid. But in the fifteen cases in which the indican was most marked there was no definite anæmia. A typhoid case should not be considered as cured until the urine is free from indican.

Early Delirium.—Aschaffenburg⁹⁴_{Mar., '95} in describing a case of early delirium says that out of seventeen such cases found in the literature, in seven the delirium preceded the fever, the latest period at which it was observed being the end of the first week, the delirium lasting, as a rule, only a few days. Six patients of the seventeen reported died. Early delirium in typhoid presents itself under two forms, both of which have as a common symptom great intellectual obtuseness. In the one form we have delirium similar to that seen in the later stages of the disease. The patients imagine that they are being electrified, etc.; they are restless and at times violent, or perhaps may be in a condition of torpor. Very often there is a primary stage of agitation followed by a stage of torpor. In the second form there is absolute confusion both of the ideas and actions. The patients sing, pray, or dance, and may be either gay or depressed. As to causation, Aschaffenburg inclines to the view that the typhoid bacilli secrete a poison which has the power of diminishing the body-heat and exciting the cerebral cortex like a narcotic alkaloid.

[The writer has observed one case of post-typhoidal insanity due to suppurative mastoiditis and relieved by trephining, and a second case of excessive and persistent delirium supposed to be due to the typhoidal poison, but examination of the ear showed otitis media suppurativa. It is imperative that the ears be examined in every case of typhoid fever presenting symptoms of delusional insanity or protracted delirium, more especially in the third week or later.—J. D.]

Dysphagia.—Vergely¹²¹_{Nov., '95} states that the forms of dysphagia may be divided into three groups: The first includes difficult deg-

lution on account of mechanical impediments produced by bucco-pharyngeal mucus. The second group consists of reflex dysphagia due to a neighboring lesion. In the third variety the difficulty in swallowing is of nervous origin and may be divided into two kinds: In the first there is dysphagia by reason of paralysis of the pharynx dependent upon cortical, bulbar, or peripheral lesions; in the second the difficulty is purely spasmodic and associated with a slight latent and pre-existent hysteria, or to an hysteria or neurasthenia provoked by the typhoid fever.

The period of the malady during which the spasm is manifested, the alternation of bulbar symptoms connected with respiration and circulation, and of serious nervous symptoms allows us to refer the dysphagia to its true cause. Nevertheless, it may be remembered that, in some exceptional cases, dysphagia is the sole nervous symptom of the disease and the prelude to quite serious nervous disturbances during convalescence.

Disappearance of First Heart-Sound.—Mongour⁸²⁷_{Sept. 4, '96} ascertained that the first heart-sound had disappeared during the course of typhoid fever in two patients. From the study of these cases and of analogous ones, the author concludes that the disappearance of the first heart-sound at the apex or at the base, at whatever stage of the disease it occurs, has no grave prognostic signification if the number of the pulsations does not exceed 110. If, however, they exceed this number the disappearance of the systolic murmur might be considered as a fatal sign. While the disappearance appears to be connected with the existence of myocarditis, the cardiac acceleration seemed rather, in his cases, to depend on a toxic action on the nervous centres. This second tendency of the toxic agent was much more serious than myocarditis, which is generally cured.

[Weakening or disappearance of the cardiac first sound is more frequently due to fatty degeneration of the muscular fibre of the heart, in large part the result of long-continued pyrexia. This condition urgently demands absolute rest and the especial avoidance of sudden exertion, so that instant death from cardiac failure be prevented.—J. D.]

Huchard, of Paris,⁵⁹_{Nov. 24, '94} thinks that the signs of heart-failure should not be limited exclusively to the determination of the weakening or the disappearance of the first sound. There are, besides this weakening, two other symptoms which he has observed; these he has named the embryocardiac and the bradydiastolic, or prolongation of the cardiac diastole. This last symptom was studied some time previously by Huchard as a new prognostic symptom in diseases of the heart. He insists upon these facts,

and advances proofs to support their correctness, and to show that there are often great errors committed in the diagnosis of acute myocarditis in fevers, and especially in typhoid fever. In this disease the autopsies he has made have proven to him satisfactorily that often, notwithstanding very grave symptoms of heart trouble, there are hardly any appreciable lesions of the muscular constituents of the heart, and reciprocally. On the other hand, there may often appear in cardiac sclerosis considerable myocardiac lesions, and that even while life may last for a great length of time. In emphasizing these conditions, the results of his personal observations and of the previous observations of Bernheim, of Nancy, in 1882, he has shown that many of the symptoms attributed to myocarditis of typhoid fever must be referred to the effect of functional disturbance or to lesions of the cardiac nervous system.

Symptomatology in Children.—W. L. Stowell, of New York, ⁵⁹_{Mar. 16, '95} records 5 cases of enteric fever in infants, and collects 80 others. The mortality was high,—25, or 31.76 per cent. The characteristic rash appears to have been noticed in 16 (possibly 18) cases; in two others there were irregular rashes. Death appears to have been due to the severity of the disease associated with marked intestinal lesions (ulceration, sloughing, perforation) in the majority of the cases, but in 2 cases it was probably determined by peritonitis; in 1 other by intestinal hæmorrhage. In 1 case only was perforation recorded. His conclusions are as follow: 1. The disease is common in childhood and not more rare in infancy than is explained by lack of exposure. 2. The types and varieties do not differ materially from those of adults. 3. The duration is shorter, because the tendencies in childhood are more toward growth and repair than in the adult. 4. The prognosis is best in children because they have healthy organs and so few complications. 5. In infants the mortality is great because of the feeble conditions of the subject. 6. Those who die of enteric fever die, as do adults, of perforation or exhaustion.

[As the eruption appeared in but 20 per cent. of the cases reported, these observations re-accentuate the well-known fact that the absence of the eruption is of but little value diagnostically in excluding typhoid fever in children.—J. D.]

I. N. Love, of St. Louis, ⁶¹_{Jan. 5, '96} explains the predominance of cerebral symptoms in these cases by the undeveloped and hyper-sensitive nerve-centres of early child-life. S. S. Adams, of Washington, ²⁷_{Feb., '96} finds that the swelling of Peyer's patches shows itself early, generally near the ileo cæcal valve, as in the case of a child 2 years old on whom he made an autopsy.

In the infant restlessness is marked and fever persists for days, with only slight irritation of the gastro-enteric tract. The temperature, which usually ranges higher than in adults, is well borne. There is usually nothing characteristic in the appearance of the tongue; vomiting is rare; the appetite uncertain. Constipation is usually persistent throughout the entire course of the disease. The typical spots are rarely seen. Tympany is rare; hæmorrhage is also rare. The spleen if enlarged is detected with difficulty. The liver and kidneys are probably unaffected. Epistaxis is rare, as is also bronchitis. Relapses are not infrequent.

Although typhoid fever less often assumes an adynamic form in children than in adults, yet cases of cardiac asthenia are, according to Sevestre,⁷³_{Dec.22,'94} not very rare. Heart-failure sometimes appears without warning, the child falling into a syncope during which he dies. In other cases the syncope passes away, but leaves the patient prostrated, pale, cold, cyanotic, and covered with a clammy sweat. The pulse is rapid, but weak, wavy, very compressible, and often irregular. Upon auscultation the heart-sounds are faint and muffled, presenting the characteristics of what has been described by Huchard and others as embryocardiac,—that is, the two sounds are indistinguishable, the one from the other, neither by their timbre nor by the inequality of intervals separating them. This severe form of heart-failure is rare, but it is not uncommon to meet with a moderate degree of this condition, as evidenced by a light cyanosis, a coolness of the extremities, and changes in the heart-sounds and pulse. Occasionally the symptoms appear to be brought on by a cold bath, or, if present in slight degree, to be aggravated by it. It is of very great importance, therefore, to keep a close watch upon the pulse in all cases of typhoid fever in children,—of greater importance, indeed, than to keep accurate record of the temperature.

Weil, of Lyons,⁷⁹_{Apr.,'95} states that desquamation in the typhoid fever of children is frequent. In 37 cases he found it in 33, and remarks that it is much more frequently met with on the trunk, the upper portion of the limbs, and on the neck; it begins to peel generally in the axilla. It is generally furfuraceous, sometimes scaly, and more rarely it falls off in large flakes. It begins generally near the end of the fever, sometimes when the fever disappears, and sometimes even after all febrile symptoms have passed away. This desquamation has no diagnostic value, nor does it afford any ground for prognosis; it is a phenomenon similar to the changes that take place in the nails and to the falling out of the hair.

Complications.—Fernet¹⁵²_{Oct.19,'94} remarks that, though typhoid

fever is nearly always a generalized disease, local manifestations are, nevertheless, often observed, and so modify the clinical picture as to render possible an erroneous diagnosis. All of these local manifestations are not, properly speaking, typhoid manifestations, but are due to secondary infections. The localizations in typhoid fever are of two kinds,—those caused by the disease and those due to its complications. The first are sometimes determined by the prior existence of a local lesion; sometimes, on the contrary, by dissemination of the bacillus through the blood and its localization at certain determinate points. The local manifestations are often, from the clinical point of view, latent, and their evolution is frequently slow. These accidents are not uncommon and should not be overlooked. The author emphasizes the fact that it is a good rule in typhoid fever to systematically examine all the organs just as we are accustomed to watch the heart in acute inflammatory rheumatism.

Wright, of Boston, ⁹⁹_{Oct. 17, '95} reviews the question as to whether the typhoid bacillus is the causative agent in the production of the suppurative complications and sequelæ of typhoid fever. Many observers hold to the view that the typhoid bacillus does cause these conditions, or, in other words, can produce pus, for in certain cases it is the only organism found in the lesions. On the other hand, many bacteriologists consider, with Baumgarten, that these suppurations are merely the result of infection with the ordinary pyogenic cocci, as has been demonstrated by a number of investigators, and that in those cases in which the typhoid bacillus has been found it was present only secondarily, while the true cause of the process, the pus-producing cocci, had accomplished their work and had died out. The author quotes two recent interesting contributions. One of these is a case of multiple abscess formation in the kidneys in typhoid fever, reported by Flexner, ²⁴⁷_{Apr., '95} in which the most careful examination of the pus by all known methods failed to reveal the presence of any other organism than the typhoid bacillus. The other, by Dmochowski and Janowski, already reviewed.

From a consideration of their work and the work of other observers who have studied this question, the author suggests that, while the typhoid bacillus may cause the suppurations of typhoid fever in a certain proportion of cases, yet in the majority of instances such processes are simply the result of secondary infection with either the staphylococcus pyogenes aureus or the streptococcus.

Martin and Robertson, of Montreal, ²⁴²_{June, '95} report a case of suppurative arthritis of the wrist in a patient with typhoid fever, the

complication being induced solely by the typhoid bacillus, as proved by microscopical examination. Swiężyński, of Warsaw, records ⁵⁰_{Nov. 3, '94} a somewhat similar instance, though merely of a peri-articular inflammation, and, like the previous authors, notes the rarity of the condition. Sultan ¹⁴⁷_{July, '95} cites the case of an individual who, six years after an attack of typhoid fever, developed abscesses in the region of the right clavicle and lower ribs. The abscesses recurred every few months. An examination of the contents, by culture, demonstrated the presence of typhoid bacilli. These bacilli are accused of producing osteomyelitis, as other forms of bacteria, especially the tubercle bacilli, were absent.

Carl Beck ¹⁰⁵²_{Nov., '94} states that in eight cases out of ten Quincke found the typhoid bacillus in the medullary substance of ribs from patients who died from typhoid fever. The medullary substance, he thinks, has the same physiological function as the spleen, and both are affected in the same way. In these cases no disease of bones had manifested itself during life-time, and it may be concluded, from these facts and others, that the bones, in the disease of typhoid fever, are usually affected. The precipitation of the bacillus in the bone-substance is partly due to the slower circulation within the same. The author recognizes, however, that these complications are rare, for Fürbringer found bone complications only five times among sixteen hundred cases. Keen has found a much larger proportion of bone troubles traceable to typhoid.

W. H. Kemper, of Muncie, Ind., ⁵⁶_{July, '95} reports a case of parotitis as a complication of typhoid fever. It occurred in a mild case of walking typhoid, in a man of 36 years, and began developing about the fourteenth day, the gland suppurating the twenty-first day of the fever and discharging for two weeks, the patient then making a rapid recovery.

Janowski ⁵⁰_{B. 17, No. 22} also observed parotitis in a post-mortem with a clinical diagnosis of hæmorrhagic nephritis of unknown origin. The patient had been ill for seven weeks with febrile symptoms. During the last week a painful swelling appeared in the region of the right parotid gland, but palpation failed to detect the presence of pus. Upon post-mortem examination the intestinal lesions of a recent attack of typhoid fever were found. On section the right parotid gland was found infiltrated with pus, bacteriological examination of which disclosed the presence of typhoid bacilli in pure culture. A case is also recorded by Thos. D. Dunn, of West Chester, Pa. ¹_{July 6, '95}

Gilbert and Fournier, of Paris, ⁹²⁷_{v. 10, p. 578, '94} report a case of typhoid fever complicated by double parotiditis and followed by biliary

lithiasis, the rose-colored spots being present at the same time. Bacteriological examination of the pus revealed the presence of the staphylococcus aureus in a state of purity. The fever terminated without further accident. Two months later the patient again entered the hospital on account of an attack of hepatic colic. She had never previously suffered from any symptoms of lithiasis. The case is noteworthy from the precocity of parotid infection and its bilateral character and, finally, its cure. It is probable, moreover, that the attack of hepatic lithiasis was caused by an infection of the biliary passages by the bacillus of Eberth, just as the parotiditis was due to an accidental infection of the parotid ducts by the staphylococcus.

F. de Quervain³¹⁹_{No. 33, '95}; ⁵_{Nov., '95} reports the case of a man, 25 years old, who, in the defervescence of a moderately severe attack of typhoid fever, had a rise of temperature with pain in the right leg. These soon proved to be the early symptoms of thrombosis of the right popliteal artery. A combination of dry and moist gangrene followed. Later there were symptoms of thrombosis of the left femoral vein. The right leg was amputated at the lower part of the femur; recovery followed without accident. The right popliteal artery and vein contained laminated, partly organized thrombi, extending far down into the branches of both vessels. Just below the joint was a deep abscess, containing thick, tenacious, grayish-red pus with a peculiar, sour odor. The pus contained motile bacilli of various sizes, which gave all the cultural characteristics of the typhoid bacillus, not staining by Gram's method. There were no cocci. The author thinks the bacilli set up an arteritis and that the phlebitis and abscess were secondary. Duchesne³¹_{No. 8, '96} reports a case of bilateral gangrene of the lower extremities in the course of typhoid fever, the patient recovering, notwithstanding the amputation of both limbs.

Wolf¹¹³_{No. 46, 47, '94} reported the case of a boy, 10 years old, who, several months after recovery from a severe attack of typhoid fever, attended with slight intestinal hæmorrhage, was noticed to use his right hand awkwardly and avoid its use when possible. The patient was quite unconscious of his peculiarity, and had suffered neither pain nor abnormal sensation in the right hand and forearm. On examination there were found palsy and atrophy in the distribution of the right ulnar nerve. The first phalanges of the fourth and fifth fingers were in a position of extension, while the second and third phalanges of the same fingers were flexed. The function of the interossei was in abeyance, and the patient was unable to separate or approximate the fingers. The muscles of the hypothenar eminence and of the first interosseous space

were flabby and wasted, and the abductor pollicis brevis was notably atrophied. The thumb was abducted. The electrical irritability of the ulnar nerve was quantitatively diminished to both forms of current. The muscles yielded the reaction of regeneration. Sensibility appeared slightly diminished to the faradic current. J. N. Mendenhall, of Plano, Texas, ²⁰²_{Sept. 10, '95} reports a case of paraplegia following typhoid fever and terminating in death.

Osler ²⁴²_{May, '95} brought before the Philadelphia Neurological Society 5 cases of neuritis associated with typhoid,—*i.e.*, 1 per cent. of his cases of typhoid,—the paralysis in 3 of the cases coming on after the temperature was normal. There was wrist and foot drop, with marked atrophy and pain in the muscles. The cases gradually improved, although 2 still had a steppage gait some months later. He raises the question whether the well-known condition of tender toes after typhoid is due to neuritis. Other cases were referred to by Wharton Sinkler and C. S. Potts.

S. B. Ward ¹⁰⁹_{May, '95} reports a case of aphasia occurring during convalescence from typhoid fever in a boy 12 years of age.

Rémond and Coumenges ¹²¹_{June, '95} report two very interesting cases in which hysterical convulsions occurred during the course of typhoid fever, in connection with elevated temperature. The first case was that of a young woman who had been a short time married and who was attacked by typhoid fever. She possessed an excitable temperament, but had never suffered from convulsive seizures. The fever, in the beginning, was accompanied by a high temperature and an irresistible premonition of death. About the fifteenth day, notwithstanding cold baths and when the temperature was very high, lethal symptoms suddenly appeared. Consciousness was lost; the pulse became thready, extremely frequent, and finally ceased; the cardiac pulsations were dull and confused; the respiration was embarrassed and tardy; sweats supervened, the eyelids were half-closed, and an ominous hiccough occurred. The family was summoned in haste, in order to be present at the last moments of the patient. Abruptly, the scene changed; the body stiffened, was thrown forward, describing an arc of a circle, and a formidable attack of convulsive hysteria succeeded the premonitory spasms. The crisis passed, leaving in its train a profound depression. On the following days new attacks took place until the patient died from exhaustion.

The authors state that typhoid epilepsy may be divided into pre-typhoid and post-typhoid. The former variety appears to be only the result of the action of soluble irritant products upon a predisposed nervous system (heredity, intoxication). Its prognosis is favorable. Post-typhoid epilepsy may be immediate, accom-

panied by uræmic troubles, or may appear in the course of a delirium dating from convalescence. It is of grave prognosis and terminates in death or complete loss of intellect. Finally, there is a mediate form of post-typhoid epilepsy, not accompanied nor preceded by uræmic manifestations, and having the same prognosis as ordinary chronic and so-called idiopathic epilepsy. In post-typhoid epilepsy there are anatomical lesions of nervous centres dependent upon bacterial agency.

Immunity.—The explanation given by W. H. Climo⁶ May 18, '95 of the comparative immunity of native troops in India, as compared with European troops, is that in childhood natives have passed through conditions arising from exposure to the enteric poison which in after-life render them exempt from the disease. This opinion is shared by many civil surgeons in large practice, by native practitioners, and by hakims. The nature of their diet also protects native soldiers from the disease.

Maiselis²⁰ B. 137, H. 3; Jan. 10, '95 gives valuable statistics bearing upon the subject of the length of the periods of immunity conferred by attacks of infectious disease. This well-known principle, which is the fundamental principle of the work of Jenner, Pasteur, Koch, Behring, and of all the workers in the field of serum-therapeutics, has, as shown by the author, been misunderstood by various writers on medicine, some of whom affirm that the survival from one attack of an infectious disease confers life-long immunity. In view of the great practical interest of the question, Maiselis collected from literature the following authenticated cases of repeated attacks of infectious diseases in the same patient:—

Small-pox.—Two attacks, 526 cases; three attacks, 9; seven attacks, 1; total, 536.

Scarlet Fever.—Two attacks, 144 cases; three attacks, 7; four attacks, 1; eight attacks, 1; seventeen attacks, 1; total, 154.

Measles.—Two attacks, 103 cases; three attacks, 3; total, 106.

Typhoid Fever.—Two attacks, 203 cases; three attacks, 5; four attacks, 1; total, 209.

Asiatic Cholera.—Two attacks, 29 cases; three attacks, 3; four attacks, 2; total, 34.

In order to avoid the danger of including cases in which relapse might have been mistaken for a second attack, only those cases have been included in the preceding statistics where the interval between the attacks was sufficiently long to preclude the possibility of the second or third attacks being relapses. Considering the fact that all cases of second attacks of infectious disease are not recognized, and that the deeply-rooted belief in immunity among the laity, as well as among physicians, often renders the diagnosis of a second attack difficult to establish, one is led to believe that repeated attacks of infectious diseases may not belong to the rarities in medicine. This consideration also tends to

establish the analogy between the immunity conferred by natural and artificial processes. The quantitative principle of immunity suggested by Ehrlich and systematically elaborated by Behring applies also to the natural processes of immunization.

Treatment—Serum-therapy.—Klemperer and Levy,⁴_{No. 38, '96} after a series of experiments, reached the conclusion that serum from immunized dogs was capable of rendering animals immune to the typhoid bacilli, and, when administered some time after infection had occurred, served to cure the animals. They administered the serum to five human patients, all of whom were in the first week of their illness. They all received three injections of 20 cubic centimetres (5 fluidrachms) each, on each of three successive days. There occurred no noteworthy change in the course of the disease, the cases progressing as mild. They conclude that the serum is without any dangerous properties, and that it does not stop the course of the disease. It may accelerate the acquisition of immunity which is acquired in each case, but they are unable to say that the mildness of the attack was due to any action of the serum.

Krauss, of Vienna, and Buswell, of Buffalo,⁵⁹_{Mar. 23, '96} also conducted experiments in the direction of the curative toxin or antitoxin of typhoid fever. Their experiments were made with cultures of blue-pus bacillus in bouillon, heated when three days old to a temperature of from 140° to 176° F. (60° to 80° C.). Subcutaneous injections of 7 minims (0.45 gramme) of this sterilized culture were made on two successive days into guinea-pigs, and a week later the animals were inoculated with 45 minims (2.93 grammes) of a virulent culture of the typhoid bacillus. None of these animals appeared to be injuriously affected by the typhoid injections, while those guinea-pigs inoculated at the same time, which had not received the preventive injection of the dead culture of bacillus pyocyaneus, died in about twelve hours. A trial of the dead culture was also made in the case of twelve men suffering from typhoid fever, two of whom died. In these two cases there were found ulcers partly cicatrized and also some patches of fresh infiltration, showing that the disease had progressed despite the employment of the remedy. In the cases that recovered there was nothing to indicate that the injections had materially modified the course of the disease. In three there was a distinct fall of temperature, generally transitory, after the first rise following the injections, but in others there was a successive appearance of spots of eruption during and after the employment of the injections, while the temperature-curve was not affected. There were no untoward after-effects which could be attributed to the action of the remedy.

Von Jaksch, ³¹⁹_{No. 21, '95} reported a series of investigations regarding the action on typhoid-fever patients of serum taken from patients convalescing from typhoid fever. The injection caused slight pain, but no inflammation nor abscess-formation. While it produced no deleterious effects, it did not in any way favorably influence the course of the disease. All patients treated in this manner recovered.

Peiper and Beumer ⁵⁷_{May 12, '95}; ²_{July 18} referred to their earlier experiments, which showed that the toxin of typhoid cultivations is contained chiefly in the bacilli themselves, for after passing a cultivation through a Chamberland filter the filtrate was less virulent than before. The bacilli are killed, without damage to the virulence of the cultivation, by warming for an hour at 55° to 60° C. (131 to 140° F). Their recent experiments show that by repeatedly injecting small quantities of virulent cultivations into sheep, antitoxic substances are formed in the organism which prevent the poisonous action from showing itself. The action of this antitoxic serum depends on its power of destroying, not the bacteria, but the poison. By injecting previously or at the same time antitoxic serum mice and guinea-pigs were protected with certainty against double the fatal dose of a virulent cultivation, and, even if injected with the antitoxin one to four hours after the fatal dose was given, they could be cured.

Rumpf, ²⁰⁰⁶_{'95} in a report on the treatment of typhoid fever by sterile cultures of the bacillus pyocyaneus, states that streptococcic cultures had no effect whatever, whereas sterile cultures of blue-pus bacilli had an effect similar to that of the typhoid bacilli. Out of 65 cases 13 to 20 per cent. were not affected. In the others the injection caused a primary rise and a fall of temperature on the second day. In this way the stage of continued fever was cut short, became remittent, and apyrexia followed. The author ascribes this not to a specific action of the blue-pus bacilli, but rather to an irritation by which the body is excited to protective action. The experiments have at present a purely scientific value, as the dosage is uncertain and the activity of the cultures variable.

A. Lambert, of New York, ¹_{Apr. 27, '95} treated twenty-eight cases with typhoid thymus-extract, but failed to obtain the brilliant results alleged by Fraenkel and Rumpf. It seemed to have been of benefit in a little more than half the number of cases. In the cases where benefit ensued the severity of the symptoms was very much modified.

Cold Baths.—Osler, of Baltimore, ⁹_{Oct. 12, '95} publishes five years' personal experience with the cold-bath treatment of typhoid fever.

During the first year of the hospital service typhoid fever was treated symptomatically. The number of severe cases admitted was unusually large, and there were eight deaths among thirty-three patients,—a percentage of 24.2. For the past five years ending May 15, 1895, systematic hydrotherapy had been used,—the method of Brand, with certain minor modifications. Each patient received a tub-bath of twenty minutes at 70° F. (21.1° C.) every third hour when the rectal temperature was at or above 102.5° F. (39.2° C.) Frictions were applied in the bath, and a warm drink or stimulant given afterward. The following are the results shown: Cases admitted during the six years ending May 15, 1895, 389; number of deaths, 34; percentage of mortality, 8.7. Cases admitted before the introduction of hydrotherapy, 33; number of deaths, 8; percentage of mortality, 24.2. Cases admitted since the introduction of hydrotherapy, 356; number of deaths, 26; percentage of mortality, 7.3. Number of cases bathed, 299; number of deaths among the bathed cases, 20; percentage of mortality in the bathed cases, 6.6. The percentage 7.3 represents the total mortality during the five years reviewed. Two advantages are claimed for hydrotherapy in typhoid fever,—a mitigation of the general symptoms of the disease and a reduction in the mortality. From his experience Osler is of opinion that these claims are well based.

Dreschfeld ²_{Apr. 20, '95} states that statistics show that, though the mortality from typhoid has very much decreased in England when considered per population, in 1871 the mortality per 1,000,000 was for England 371, for London 267, for Manchester 450; in 1892 it had fallen for England to 137, for London to 102, and for Manchester to 240. The case death-rate, or the relation of the mortality to the morbidity, as shown by the reports of some of the largest fever hospitals, still shows a mortality of 17 per cent. This compares unfavorably with the mortality observed in some of the large German and American hospitals where treatment by the cold bath is carried out systematically. As yet the good effects of the antiseptic treatment, which is now largely adopted in England, and which has many advocates, is not apparent from the statistics. At the Monsall Hospital, where the treatment has been tried for some time, the mortality has somewhat diminished, but is still over 13 per cent. Zinn ³⁴_{May 28, '95} also finds that the experience of the last few years is not such as to give antipyretic drugs the first place in the treatment of enteric fever. Regulated bath treatment, alone or combined with quinine, still remains the best treatment.

Scientific support is given the cold-bath method by Ausset,

of Limoges, ¹⁰⁰_{Nov. 27, '96} who has been making extensive experiments on the effects of the cold bath upon urinary toxicity in infectious diseases, especially typhoid fever, scarlet fever, and measles. He finds that in all cases the toxicity of the urine is greatly increased under the influence of cold baths. He attributes to this fact the excellent effects of Brand's method of treating febrile diseases by the cold bath, the temperature being lower and the course of the disease being favorably influenced by the increased elimination of the toxins produced by the specific microbes of the disease.

A. Jacquet, of Bâle, ⁹⁰_{Nov., '95} finds that the number of blood-corpuscles is often considerably diminished in fever. After a bath of ten minutes' duration at 27° C. (80° F.) in most cases one observes an increase of blood-corpuscles to the extent even of 500,000 per cubic millimetre. In health a cold bath has the same effect, but to a less extent. Antipyrin has no such action, even when given to the extent of 0.6 gramme (9½ grains). Jacquet produced in rabbits an artificial hyperthermia by keeping them at a uniform temperature of 37° C. (98.6° F.) for twenty-four to thirty-six hours, until their temperature reached 40° to 42° C. (104° to 107.6° F.). Blood drawn from the ear showed a considerable diminution in its red corpuscles, while, on the contrary, there was a decided increase in the corpuscles of the liver. It would seem, therefore, that in fever the corpuscles accumulate in those organs where the circulation is slowest,—*e.g.*, liver,—and the cold bath acts like a tonic on the circulation and tends to get rid of this globular stasis, thus causing the corpuscles to be more equally distributed in the general circulation.

To show the great superiority of the tub-bath in reducing temperature (supposing that to be desirable) and the absence (so far as observed) of any difference in the effect of the two methods of bathing on symptoms referable to the nervous system, Richard C. Cabot, of Boston, ¹⁴⁴_{Oct., '94} reports the results observed in the service of E. G. Cutler at the Massachusetts General Hospital. Out of ten hundred baths given only two hundred were full baths. All baths, whether by sponging or in the tub, were given once in four hours in case the temperature was at or over 102.5° F. (39.2° C.).

Tub-baths were all at 65° F. (18.3° C.) and lasted twenty minutes, vigorous skin-friction being given throughout. Sponge-baths were given according to a schedule, starting with 65° F. (18.3° C.) for a fever of 102.5° F. (39.2° C.) and using water five degrees colder for each one-half degree of fever above 102.5° F. (39.2° C.), and when above 105° F. (40.6° C.) ice-water. Sponge-baths lasted half an hour, the patients lying on a rubber sheet and the water squeezed and rubbed upon them with a large sponge.

Half an hour after each bath the temperature was recorded again. Eight hundred sponge-baths gave an average drop in the temperature half an hour after of 0.4° F. (0.22° C.). Two hundred tub-baths gave an average drop in the temperature of 2.4° F. (1.33° C.). After a tub-bath the temperature often fell to normal or even sub-normal. The largest single drop was from 105.5° F. (40.8° C.) to 96.5° F. (35.8° C.). This was in a child of 6 years. No untoward results followed in this case nor in any other.

The number of baths needed under the tub-bath system was much less than under sponging, for after a full bath it often took eight hours and sometimes twelve for the temperature to get up to 102.5° F. (39.2° C.) again. Sponge-baths brought the temperature to normal only three times in eight hundred baths given. Not infrequently the temperature would be from one-fourth to two degrees higher after a sponge-bath than before, and in a few cases this happened after tub-baths.

Miscellaneous Measures.—Gordon M. Byers²⁸²_{No. 10, '96} reports twenty-two cases treated by Yeo's method. This mixture is practically a solution of chlorine, generated from potassium chlorate and strong hydrochloric acid in water, to which are added quinine and syrup of orange-peel. In addition a calomel or other purge is given in the initial stage of the fever, if diarrhœa does not exist; the large intestine is washed out twice daily with naphtholated water; feeding is carried on so as to avoid any bulky residue; an intestinal antiseptic is administered at the same time as the food. Antipyretics are objected to, but phenacetin in 5-grain (0.32 gramme) doses may be used.

R. W. Wilcox, of New York,⁵⁹_{Feb. 8, '96} finds that the aqua chlori (U. S. Phar.) is an efficient means of administering chlorine, but its solution must be freshly prepared every two, three, or four hours. Well diluted, it can be administered in doses of from 1 to 4 drachms (4 to 16 grammes). The use of chlorine in moderate doses lowers the temperature, calms nervous disturbance, cleanses the tongue, improves digestion, and has a favorable action on the intestinal ulceration.

Favorable reports on the same method are given by J. Moseley Kerr, of Columbus, O.,⁹_{Dec. 22, '94} and Emil King, of Fulda, Minn.⁹_{Sept. 14, '96} The latter author enumerates the advantages of the Yeo chlorine-quinine treatment, especially valuable to the country-practitioner, who has to encounter prejudice and poverty, as follows: 1. The temperature is appreciably lowered. It seldom rises above 102.6° F. (39.3° C.) after the medicine has been administered for two days. 2. There is almost an entire absence of nervous symptoms. The so-called typhoid condition does not develop. The patient is

usually able to get considerable sleep, and the headache soon disappears. 3. The general condition of the alimentary canal is much better. The foul tongue clears to some extent, so that it may even lose its peculiar character; the stomach retains nourishment better; diarrhoea is seldom severe, and tympanites does not develop except over a limited area in the right inguinal region. 4. The duration of the disease is distinctly shortened and convalescence is more rapid. Many cases will show a normal temperature by the eighteenth day, few going on to the twenty-fourth. Convalescence is more rapid because the patient is not so weak. 5. Complications are fewer, and the mortality is greatly lessened. Twenty-six cases have been reported, with no deaths.

J. S. Carpenter, of Pottsville, Pa.,⁸⁰ June,⁹⁶ gives the details of five cases of typhoid fever from an epidemic of forty treated by him in which he used guaiacol as an antipyretic. A maximum dose of 35 drops was employed, the average satisfactory dose being from 15 to 20 drops. When one application fails to cause a reduction of temperature within two hours, a second one may be made; and, according to the author, a reduced dose will effect as much lowering of body-heat under such circumstances as is desirable. His best results were obtained when the drug was combined with cold-water baths or spongings. McCormick, of Williamsport,¹¹⁹ Nov. 23,⁹⁶ however, used the drug alone, applying it in the right iliac region, according to the method recommended by Solis-Cohen.¹¹⁹ Jan. 12,⁹⁶ The largest dose used was 25 drops and the smallest 2 drops. The greatest reduction of temperature was from 106.8° to 101° F. (41.6° to 38.3° C.), by the application of 5 drops in a patient very susceptible to the drug. J. W. Yeatman, of Auburn, South Australia,²⁶⁷ Dec. 15,⁹⁴ used it without success in one case.

R. E. McVey, of Topeka,⁸⁰¹ Oct. 27,⁹⁴ states that a very good way to give quinine in typhoid fever is to put 20 grains (1.3 grammes) in a pint ($\frac{1}{2}$ litre) of ice-water and inject it into the rectum at night. In this way the tonic effect of quinine and the antipyretic effect of cold water are obtained without disturbing the stomach.

J. C. Wilson, of Philadelphia,¹⁴⁴ Nov.,⁹⁴ says that the tympany of enteric fever can often be favorably influenced by repeated rectal injections of from 5 to 6 ounces (155 to 185 grammes) of ice-water, retained for some time in the bowel. In heart-failure the author finds caffeine or one of its preparations to be the best heart-tonic that can be given.

Legendre, of Paris,³⁵ July 6,⁹⁶; ⁹⁰ Oct.,⁹⁶ insists strongly on the necessity of care to maintain cleanliness of the mouth. He orders: 1. The teeth to be brushed daily with an antiseptic powder thus composed:—

- R Powdered carbonate of magnesium,
 Powdered carbonate of lime, āā 10 grammes (2½ drachms).
 Powdered boric acid,
 Powdered red cinchona-bark, āā 5 grammes (1¼ drachms).
 Essence of mint, q. s.

2. Washing of the mouth with a saturated solution of boric acid flavored with thymol. 3. Cleansing the tongue several times in the twenty-four hours with a lemon, followed by a swabbing of the mucous membrane with a pledget of absorbent cotton-wool, soaked in the following mixture:—

- R Chlorate of sodium or of potassium, . . . 3 grammes (45 grains).
 Glycerin,
 Water, āā 15 grammes (½ ounce).

C. A. Ray⁵⁹_{No. 1280, p. 615, '96} reports eighty-one cases of typhoid fever with three deaths. The treatment consisted of an initial dose of calomel, which was followed within twenty-four hours by a reduction of temperature. Hydrochloric acid was given with a pepsin preparation in all cases. Salol, enteric creasote pills, and quinine in solution were used when intestinal antiseptics were indicated. Ice-water was given, as much as the patients wished to drink. Constipation was treated by enemata of warm water. No laxatives were administered excepting in cases where the diarrhœa did not respond to ordinary remedies and the presence of foreign matter was suspected. Brandy, strophanthus, and strychnine were used to combat heart-failure. In most cases the temperature was reduced by baths and iced-water enemata; in some of the more robust, acetanilid, phenacetin, and antipyrin met the same indication. The diet was almost exclusively peptonized or sterilized milk.

P. Legendre⁶⁷_{p. 461, '94} states that delirium at the commencement can be best treated by baths, if there be no contra-indication to their use. If the patient be more tolerant of warm baths, progressively cooled, these first may be tried. If he rebel against the duration of the bath, cold affusions to the head, with successive lowering of the temperature, may be employed. If this symptom appear in the second week, it is quite likely to be due to the elevated temperature, and reduction of this will relieve the delirium. If, in spite of this, the symptom be accompanied by absolute insomnia, or there be a tendency to get out of bed, opium, chloral, or the bromides are indicated.

An editorial writer¹¹⁹_{Sept. 7, '96} quaintly refers to the doctrine which our present knowledge of typhoid fever and its treatment would seem to support. In the opinion of the writer, with good treatment and good nursing the mortality of typhoid fever should not exceed 7 per cent., and, except under very unfavorable circum-

stances, it might be reduced to less than 5 per cent. In 75 cases out of 100 of typhoid fever the patients left to themselves, without interference on the part of physician or nurse, will get well. In 70 cases out of 100, typhoid-fever patients will survive poor medication, provided they have good nursing; and in 65 cases out of 100 they will probably survive even bad medication and bad nursing. Furthermore, the severity of the cases encountered at different times varies very greatly. Fifty or sixty cases in succession may recover with any treatment or no treatment; three or four cases in succession may perish in spite of the best treatment. Hence, conclusions as to the comparative merits of different plans of treatment cannot be drawn from any but massive statistics. In general, the simpler the treatment in typhoid fever, the better; the less number of drugs given, the better; the less quantity of whatever single drug will answer the purpose that is taken, the better; the more closely nature is followed, and the more cautiously rash interference is shunned, the better.

Typhus Fever.

S. Dana Hubbard, of New York, ⁵⁹_{July 6, '95} reports two cases simulating typhus fever. At the post-mortem of the first case there were found general evidences of an acute infectious process. In addition, the stomach and entire intestine to within three inches of caput coli, where it terminated abruptly, were filled with a dark, grumous mass, apparently clotted blood. The cause of this hæmorrhage was found at the lower end of the œsophagus. There were three lineal ulcers of varying length, arranged in a circular manner around the lower opening; the largest ulcer being about an inch and a quarter long and its depth extending through to the outer coat of the œsophagus. The latter abscess was evidently the cause of the hæmorrhage and of the fatal termination, for it had eroded an artery. Owing to the peculiar shape and position of the ulcers one might suppose them to have been traumatic, as caused by sword-swallowing, though this could not be verified. The post-mortem examination of the second case showed, besides the evidence of an acute infectious process, several ulcers, some of which were very large. The presence of these undoubtedly served to clear the diagnosis of typhoid fever. The author reports these cases to illustrate the necessity of care in making diagnosis, isolation and observation being the only means capable of affording positive information.

S. Terzykowski, ⁷⁸³_{No. 10, '94} ⁶⁷³_{June, '95} has examined three cases of nervous disturbances after typhus fever, diagnosing transverse myelitis in two cases and disseminated myelitis in the third. One case ended

in recovery, but in the others complete recovery did not ensue, and the patients were lost to sight. The question as to whether these disturbances are occasioned by the typhus bacilli or by their toxic products has not yet been solved. The noxious factors reach the nervous centres through the lymphatics and blood-vessels, as well as the peripheral nerves.

De Brun, of Beyrouth, ⁹²_{Nov., '94} discusses a recent epidemic of typhus fever occurring in that city. The characteristic eruption appeared from the third to the fifth day and was observed in three-fourths of the cases. The character of the rash did not always correspond to the severity of the disease. Vomiting was frequent, and a case is recorded in which it largely contributed to the fatal issue during defervescence. Constipation was almost constant, the abdomen being painless and not distended. The author draws great attention to the myocarditis so frequently present and to the condition of the pulse. During defervescence it may render the prognosis serious. Pneumonia, lobar or catarrhal, and pleural effusion were never noted.

Treatment.—E. Legrain ¹⁰⁰_{July 4, '95}; ⁴⁵¹_{Oct., '95} gives the history of an epidemic of exanthematic typhus in which sero-therapy was tried with beneficial result. The epidemic started in the civil prison of Bougie, in the province of Constantine, in November, 1894; on the 20th of November there were ten fully-developed cases. The prison was built in 1803 on the site of a cemetery; and from 1809 to 1816 all the parts of the west of the city were used as burying-places for a large number of Kabyles who had died of a pest. There is a question whether typhus could renew its activity after such a long time. The epidemic assumed very serious proportions, the Europeans being the greatest sufferers. Serum was prepared from two convalescents from grave typhus, and three patients were injected with 2, 4, and 6 cubic centimetres ($\frac{1}{2}$, 1, $1\frac{1}{2}$ drachms), respectively. The temperature fell in all in proportion to the quantity of serum injected, the injection of 2 cubic centimetres ($\frac{1}{2}$ drachm), giving a drop of 1.2° C. (2.15° F.). A case is reported that had been for two days in a desperate condition: profound stupor; temperature-curve high and without remission; marked pericardial effusion; pulse thready and irregular, 135 per minute; toxic hemiplegia; respirations, 52 per minute. No relief was produced by cold baths or by painting with guaiacol. An injection of 10 cubic centimetres ($2\frac{1}{2}$ drachms) of serum was given, and in five hours the temperature had fallen 2° C. (3.60° F.); pulse 100, full, and nearly regular; the pericardial effusion had diminished in considerable degree; the urine became abundant, and the respiration became more calm, almost normal. This

benefit was not lasting, and in forty hours a second injection of 12 cubic centimetres (3 fluidrachms) produced a permanent amelioration of the symptoms. The fall of temperature was not sudden; in taking the temperature every two hours it was noticed that the drop commenced three hours after the injection, and reached its maximum at the fifteenth hour. The cardiac phenomena are probably toxic, and not organic affections of the myocardium or of the valves. In a certain number of cases the pulse was improved in a very short time after the injection; from thready it became full and more regular. Generally the slowing of the pulse kept pace with the fall of the temperature. In several cases the coma disappeared in eight or ten hours after the injection of the serum. A case of left-sided hemiplegia, evidently of toxic origin, disappeared in eight hours after the injection. As a rule, the injections have very sensibly relieved the state of patients suffering from grave typhus, when the injection is made in the first days of the disease. The author states that the use of injections should be reserved for these severe cases.

Influenza.

Pathology.—*The British Medical Journal* in an editorial states that the last outbreak seemed to show a great tendency to affect more especially the respiratory organs, differing in that respect from the epidemic of 1889, which fell with especial force upon the nervous system, and conforming more nearly to the type of disease which prevailed in the spring of 1891 and in the winter of 1891–92. Thorne Thorne, ²_{Mar. 2, '99} speaking of the investigations of Klein, says that, while in the blood only one of the cases examined showed the bacilli believed to be the cause of the disease, it was otherwise with the bronchial sputum of the cases which had passed through the febrile stages. This, in each instance, contained bacilli described by Pfeiffer and Kitasato, which in a recent case were so numerous as to amount almost to a pure cultivation. The editorial writer concludes that we may consider influenza as an infectious febrile disease, the primary seat of which is in the mucous membrane of the respiratory tract, where it may sometimes be so severe as to cause rapid death from pneumonia, sometimes so slight as to be almost overlooked. The toxins which it produces are absorbed, and lead to great depression and enfeeblement of the system, and predispose to the occurrence of pneumonia, broncho-pneumonia, and bronchitis as secondary infections.

Recent investigations, according to Trouillet, ²²_{Mar. 6, '95} have shown that the influenza microbe can easily be cultivated. From observations made upon one hundred cases of the disease, he has

determined that the specific microbe in question appears in different stages of its growth,—as a diplococcus, a bacillus, or a streptobacillus. Experimenting, moreover, with rabbits he found that after injecting the animals with 15 to 20 minims (1 to 1.3 cubic centimetres) of a culture of the influenza microbe they developed symptoms of a disease which appeared to be analogous to influenza, and died within from two to twenty days. Lastly, he affirms that the microbe of influenza is found generally dispersed throughout the body of a person suffering from the disease, appearing not only in the blood, but also in the various tissues.

A case reported by Hitzig³⁴_{No. 35, '96} of influenza-pneumonia followed by unmistakable signs of abscess of the lung, in which Pfeiffer's bacillus was the only organism found in the sputum, is of great interest in this connection. The attack of pneumonia occurred during an influenza epidemic, and the clinical picture was that of influenza-pneumonia. In the sputum, at the time the physical signs of the abscess were present, were found numerous round cells, elastic fibres, alveolar epithelium, and hæmatoidin crystals. No tubercle bacilli were found.

Henry Waite, of Leeds,²_{June 22, '95} looks upon influenza as a specific nervous fever for the following reasons: Like cerebro-spinal fever, it is infectious and accompanied by most of the symptoms and liable to many of the sequelæ of that complaint. The catarrhal symptoms are in most cases trivial. The backache is spinal, and is not affected by posture or ordinary movement in the same way as lumbago. The pain in the limbs ranges from severe neuralgia to mere nerve-fatigue or exhaustion. The headache, delirium, tinnitus, etc., are due to implication of the cranial nerves. The vomiting and diarrhœa are probably reflex. The complications are mainly nervous: 1. Temporary blindness from optic neuritis. 2. Suspension of the sense of smell, taste, and hearing. 3. Menorrhagia in females, vasomotor disturbance. The sequelæ are also mostly nervous. Finally, he considers his contention as to its being a disease of the nervous system as borne out by the treatment most successful up to now,—antipyrin and its allies, bromides, quinine in various forms, and the like,—nerve-sedatives, and nerve-tonics.

P. P. Jennings²_{June 8, '96} reports two fatal cases of influenza in subjects who had previously sustained a fracture of the skull. The chief interest attached to these cases consists in the fact that the influenza was the cause of the setting up of an active process in the previously injured skulls.

Complications.—Rhyner³⁴_{Nos. 9, 10, '96} reports his observations of three cases of influenza-pneumonia which progressed to gangrene. In the first case the sputum and expired air were fetid from the be-

ginning of the illness. The patient died with symptoms of sepsis in the third week. In the second case the gangrenous focus broke through the pleura, causing a pyopneumothorax. Following evacuation of the pus, recovery ensued. The third case is still under observation. In this case a pyopneumothorax also occurred. The operation, however, produced but little beneficial effect, as purulent discharge, cough, and hectic fever still continue.

Gruss, of Vienna, ³¹_{June 1, '95} reports the case of a man who was suddenly attacked by epidemic influenza. The signs of a left-sided pleural effusion were early manifested. The diagnosis was doubtful, when a tumor was discovered beneath the false ribs of the left side and extending to the median line. Several days later there was developed a thrombosis of the left cephalic vein with considerable œdema of the arm, a thrombosis of the left thyroid vein, and finally an hæmorrhagic purpura. The purpura recurred several times. James F. Goodhart, ¹⁵_{Aug., '95} has met with thrombosis in influenza so frequently that he is led to believe there must be some intimate relation between the two. J. B. Cathomas ³⁴_{July 2, '95}; ⁹⁰_{Aug., '95} refers to a number of recorded cases of affections of the circulatory system following influenza,—viz., phlebitis, slow action of the heart, pericarditis, endocarditis, venous thrombosis, embolism following the cardiac disease, and arterial thrombosis. From a review of these cases and of others recorded in literature the author concludes that in the course of influenza, as in other infectious diseases, vascular occlusions may occur. This complication may be due to embolism or to venous or arterial thrombosis. Arterial thrombosis, which is a rare complication of influenza, may have a quick and sudden onset like arterial embolism.

Galliard ⁶⁷³_{Sept., '95} reports a case in which acute inflammation of the right lobe of the thyroid followed an attack of influenza. Suppuration was at first feared, but the thyroiditis ended in resolution. The patient, aged 40 years, had never had goitre. She was exposed to cold during menstruation and soon after developed the thyroiditis. After resolution tachycardia and palpitation were observed, but the thyroid swelling did not return. W. B. Russell, of Colwyn Bay, North Wales, ²_{May 4, '95} C. W. Smeaton, ²_{May 18, '95} and P. O. W. Browne, ²_{June 8, '95} report cases of acute bronchocele following influenza.

C. Baumgarten, of St. Louis, ⁶⁷³_{July, '95} related eight cases which had demonstrated to him that influenza was often the source of degenerative changes in the kidney, changes which do not sometimes become apparent until the influenza has been forgotten. This fact is evidenced by the statistics of life-insurance companies. During the influenza period and following it he had observed al-

buminuria in $3\frac{1}{2}$ per cent. of the cases examined, while in the period in which influenza did not prevail he had observed but 1 per cent. Besides transient albuminuria, acute degeneration of the kidney, acute inflammation, both forms of chronic diffuse nephritis, and persistent albuminuria not belonging to one of these groups have been observed. A. Jacobi, of New York, also testified to the frequency of renal complications in the disease, ascribing them to toxins, as after diphtheria and during typhoid fever. Contrary to what is observed in scarlet fever, these cases usually get well in a few weeks or months, few of them becoming chronic. James Tyson, of Philadelphia, had observed several cases of albuminuria in patients free from renal trouble before influenza, and had noted also that so-called healthy, physiological, or cyclical albuminuria became more serious after an attack of influenza, and that casts appeared in the urine. F. C. Shattuck, of Boston, related a case in which hæmorrhages occurred, with suppression of urine, and later an enormous amount of albumin. Anæmia supervened, followed by neuritis and death.

Comby, of Paris, ¹²¹_{May, '95} had under his care a case of cystitis caused by grip. The cystitis was characterized by pain in the lower part of the abdomen; painful micturition, with hæmaturia at the end of the act, supervened on the eighth day of the grip and yielded readily to treatment. During the present year a child had entered his service suffering from suddenly developed fever, the tongue of grip, and hæmaturia. The blood was intimately mixed with the urine during the whole time of emission, pointing to the kidney, and not the bladder, as the source of the hæmorrhage. There was also severe lumbar pain dependent upon renal congestion. Lamarque ¹⁷_{Sept. 28, '95}; ¹_{Oct. 19, '95} has recently studied the genito-urinary complications due to influenza. According to this author, the poison acts very often on the kidneys. In the simplest cases there is a sometimes severe inflammation of the glomeruli, with slight albuminuria, which lasts for several days and then disappears without leaving any traces and without modifying the progress of the disease. In other cases it produces serious nephritis, which from the start exposes the patients to symptoms of renal insufficiency, and death from uræmia may be very rapid. The nephritis of influenza is recovered from in the majority of cases; but it may also pass into the subacute or chronic state.

Paillias ⁹⁴_{May, '95}; ²¹³_{June} describes a case of aphasia observed in the course of influenzal pneumonia. Cases of pneumonic transitory aphasia have been described by Chantemesse and Monysset. In this instance it occurred on the second day of an attack of influenza complicated with pneumonia, was associated with a degree

of agraphia and numbness and tingling in the right arm, was rendered more pronounced by prolonged effort to speak, and persisted until death, which took place on the thirteenth day of the illness. Dargelo³⁴⁸_{July 20, '95} likewise reports a case of transitory aphasia following an attack of influenza.

Rendu, of Paris,⁷³_{Jan. 5, '95}; ¹_{Feb. 2} gives the histories of two cases of cerebral sclerosis following an attack of influenza. The first case was that of a young and vigorous man who had presented successively, during recovery from the disease, an incomplete, transitory hemiplegia which had lasted for fifteen days. Four months later symptoms of neurasthenia set in, followed by astasia, and, finally, symptoms of sclerosis in disseminated patches. The second case was that of a child, 3 years old, who had had an attack of amygdalitis which had been contracted during an epidemic of grip. The child had been seized with convulsions, Jacksonian epilepsy, then transitory hemiplegia followed by partial hypertrophy of the limbs. Rendu considers these cases as interesting, the question of local or diffuse sclerosis being still obscure clinically.

W. J. Barkas,⁶_{Jan. 26, '95}; ⁵_{July} has reported the case of a medical man, 36 years old, who resided in a district which was extremely cold in winter, and whose brother and father had had attacks of facial palsy. Several weeks after an attack of influenza, at a time when the weather had become extremely severe, the man noticed paralysis of the muscles supplied by the facial nerve, first upon the left side and a day later upon the right. For two days before the paralysis appeared an absence of taste was noticed, but this may have been due to the condition of the surface of the tongue. Sensibility was everywhere preserved. The facial nerves were tender on pressure at their point of exit. Under energetic treatment improvement speedily set in and progressed to ultimate recovery.

T. C. Maxime, of Lyons,⁶_{Apr. 13, '95} gives a brief account of post-influenzal meningitis. In meningitis following influenza there is no lesion whatever to be found at the necropsy, either in the brain or medulla. The affection is carried by the special action of the toxins secreted by the influenzal microbes producing inhibition phenomena,—toxins which appear to have a very special predilection for the nerve-centres. Sometimes, though the event is rare, in cases of patients dying from meningitis which has supervened on influenza, suppurating lesions of the brain and meninges are found, but these cases are not instances of post-influenzal meningitis strictly so-called; it is rather a secondary affection brought out by influenza,—a true meningitis preceded by influenza and due to a streptococcus, staphylococcus, Eberth's bacillus, or more

often to the pneumococcus. But these cases of suppurative meningitis succeeding influenza are very rare.

D. L. Davies, of Preswylfa, Criccieth, North Wales ² Apr. 20, '96; D. C. Black, of Glasgow ² May 4, '96; T. H. Moorhead, ² May 4, '96 and R. H. Fox, of London, ² May 4, '96 report cases of cerebral meningitis following influenza. A fatal case of cerebro-spinal meningitis following influenza is recorded by A. W. Tabuteau, of Dunfanaghy. ² June 22, '96

Müller ³⁴ Oct. 8, '96; ² Nov. 23 analyzes, from the point of view of influenza and the female generative organs, 157 cases occurring in women. He first discusses the effects of influenza upon pregnancy, illustrated by 21 cases. Of these 21, 2 were near the end of pregnancy, 1 in the eighth month, 1 in the sixth, and the remaining 17 in the first to fifth month. Of the 17, abortion occurred in 15. Of the remaining 4, the pregnancy was uninterrupted in 1, miscarriage was undoubtedly due to the influenza in another, but in the other 2 it was impossible to state positively the relation of the influenza to the delivery. In 1 of these cases the patient was seized with fever the day before delivery, and later the pains came on. The infant appeared premature, and its birth was not expected for a fortnight. In the other case birth occurred a week before the expected time, but the foetus appeared fully developed. In the case in which pregnancy was uninterrupted, abortion had occurred during an attack of the disease in a previous epidemic. In the other 15 cases the author thinks that the abortion was due to the influenza. Thirteen of these patients he saw then for the first time, but the remaining 2 had previously been under his treatment (1 for retroflexion and the other for cystitis). Both these last patients had endometritis, but they were looked upon as cured. There was no evidence of disease of the appendages in these 15 cases. It was very striking that at the same time as the onset of the influenza, or shortly after it, the pains or hæmorrhage appeared. Protracted blood-stained lochiæ were often observed, without there being any evidence of anything being left behind in the uterus. Among the 138 non-pregnant women, all, with the exception of 3, had either menorrhagia or metrorrhagia, or an already existing local disease was made worse. The author says that, as in cholera, typhoid fever, measles, scarlet fever, etc., an hæmorrhagic endometritis may occur in influenza, causing bleeding or the interruption of pregnancy.

T. M. Burns, of Denver, ²³ Sept., '96 bases his diagnosis of influenza during the puerperal state upon the presence of marked and repeated chills; severe pain in the head, body, and extremities; gastric and pulmonary disturbances, the short duration of the disease (four to seven days is given as the average duration of the

grip), and upon the presence of an epidemic. He thinks that the pain and soreness of influenza are alone sufficiently characteristic to establish the differential diagnosis between it and any form of puerperal fever.

Franke ²²⁶_{B. 49, 11, 3, '95}; ⁵_{Oct., '95} alludes to the complications manifesting themselves in the fascias, principally in the plantar fascia, which becomes thickened and sensitive to pressure, and renders standing and walking painful, while it is relieved on lying down. Another manifestation, the author believes, is seen in the condition described by Albertas "achillodynie," where the insertion of the tendo Achillis becomes the seat of a periostitis without any definite history of injury or traumatism. The inflammation is most frequently seen in the bone and periosteum, where it may either produce simple œdema and swelling or may go on to suppuration without resolution taking place. The involvement of fascias is next in frequency of occurrence, while instances of a pure arthritis of this description are very rare. The disease may manifest itself three or four days after an attack of influenza or it may not appear for weeks after the attack. It is more liable to be found after a second attack or in patients who have been the subjects of a series of attacks. The stubbornness with which the disease resists all methods of treatment should lead one to suspect its etiology, and a history of previous attacks of influenza or indications of a concurrent attack should confirm the diagnosis. The best treatment is moisture, with warmth, followed by massage, with appropriate treatment in case of suppuration.

Treatment.—Clemente Ferreira ¹¹⁸_{Mar., '95}; ⁵¹_{Aug., '95} calls attention to some clinical peculiarities of the broncho-pneumonia of influenza in children. Three marked peculiarities were observed: 1. Slight elevations of temperature (37.6° C.—99.6° F.), which seem to point to a paralysis of the thermogenic centres by the influenza germ. 2. Early tendency to bronchoplegia and pulmonary collapse, apparently due to a general adynamic condition, resulting from complete depression of the vital powers by the toxins of the grip. 3. Extraordinary slowness of the course of the disease, the evolution of the bronchitis or broncho-pneumonia remaining stationary indefinitely. The author condemns the use of emetics, as being a powerful factor in the production of pulmonary collapse and in the increase of the general prostration. The indication is to use stimulating expectorants early, thereby exciting the bronchial muscle-fibres, and to re-animate the innervating powers by means of alcohol, caffeine, and injections of camphorated oil. This treatment must be pursued energetically from the very onset of the attack, in order to be successful.

Plicque ¹¹⁵³_{Feb.6,'95} advises the following treatment of influenza: Antiseptic treatment to the nose, mouth, and pharynx is important; boric-acid gargle, boric vaselin to the nasal cavities, and great care of the mouth. This treatment does much to avoid complications and, perhaps, broncho-pneumonia. For the spasmodic cough in thoracic complications he recommends

R Tinct. belladonnæ,
 Tinct. aconiti,
 Tinct. droseræ, āā 30 minims (2 c.cm.).
 Tinct. myrrhæ, 2½ fluidrachms (10 c.cm.).
 M. Sig.: 20 to 30 minims (1.3 to 2 cubic centimetres) per diem.

H. A. Stonham, of London, ²_{Mar.30,'95} has tried cinnamon in some fifty cases of the disease, and has certainly found it far more useful than the ammoniated tincture of quinine. He gives simply 1-drachm (4 grammes) doses of the tincture three times a day. The author states that thirty of the cases were benefited, and the pains in the head and back were relieved after three or four doses.

I. Burney Yeo, of London, ⁶_{Mar.2,'95} ⁶⁷³_{Apr.} protests against the somewhat reckless use of such drugs as salicin and antipyrin in influenza. It is true that these agents produce relief of the immediate symptoms, but he has frequently observed that patients thus treated often have a tedious convalescence and are subject to recurrent attacks of cardiac debility and other serious sequelæ. Clinical and experimental evidence, in his opinion, goes to show that quinine is a true antitoxin in influenza, and that, in spite of the disagreeable effects which it sometimes causes, it should be mainly relied upon in the treatment of the disease, simply giving a few doses of such drugs as salicin and antipyrin at the onset to afford relief. Marsh, of Macclesfield Infirmary, ⁶_{Mar.9,'95} confirms Yeo's belief in the efficacy of quinine, but suggests that, since the drug is not completely excreted from the tissues for some days, it is not necessary, in order to produce its specific effect, to give the drug in such large doses as to produce cerebral symptoms; 3 to 5 grains (0.2 to 0.32 gramme) given in an effervescent saline draught every three or four hours markedly controls the course of the disease and rarely gives rise to cinchonism. The large doses of quinine given on the Continent in this disease appear to be quite unnecessary and not altogether devoid of danger. Marsh has seen 15 grains (1 gramme), given every three hours, produce marked cardiac depression, particularly in elderly people. Comparatively small doses undoubtedly in many cases exercise a controlling influence on the course of the disease, yet the pyrexia with its attendant symptoms may be but slightly relieved, and for this purpose 3 to 5 grains (0.2 to 0.32 gramme) of phenacetin combined with a few grains of

citrate of caffeine act as a safe and efficient antipyretic and anodyne. Grant, of Elgin, Eng., in commenting on Yeo's statements, expresses the opinion that the diminished mortality and shortened period of convalescence of the recent epidemics, as compared with the first epidemics observed, are due not to the lessened virulence of the bacillus, but to the fact that antipyrin and similar depressants are being withheld in the treatment. He is convinced that antipyrin was responsible for the pneumonia complicating the disease.

Mossé, of Toulouse, in a recent communication to the Paris Academy of Medicine, also advocates the use of quinine in influenza, as a prophylactic and in the abortive treatment, when large doses should be given; while in serious secondary infections hypodermatic injections should be employed. He has demonstrated by experimental and clinical research that the microbe of influenza cannot live in an organism impregnated with quinine.

J. H. Barnard, of Paris, ⁶_{Mar. 23, '96} concurs with the warning issued by Burney Yeo and Moffatt against overtreatment in influenza, but contends that the suffering of the patient should be alleviated by active measures. He has almost invariably been enabled to bring down the temperature and rid the sufferer of his pains in a few hours by the exhibition of 4- to 6-grain (0.26 to 0.39 gramme) hourly doses (in cachets) of phenacetin. Should, as is rarely the case, pain and fever continue, he prescribes 2 more cachets at intervals of four hours. At the same time he gives, every three hours, an effervescent draught containing 10 grains (0.65 gramme) of potassium nitrate.

W. L. Stowell ⁵¹_{Oct. '96} states that in children salicylate of sodium has become his routine for cases with pains and fever, 2 or 3 grains (0.13 or 0.2 gramme) being given every three hours to older children. The older children and adults did well on maltine with coca-wine, which seemed to be especially adapted for neurasthenic conditions.

Claus ¹²¹_{May, '96} states that, in twenty cases of influenza attended with variable neuralgic pains (sciatica, intercostal neuralgia, cephalalgia, and other symptoms), remarkable amelioration was at once noted after the administration of 1.0 to 2.0 grammes (15 to 30 grains) of salophen. In the majority of cases recovery ensued within the course of two days. Salophen embodies the advantages of the salicylate of sodium without possessing the disadvantages of the latter.

A. Hennig ³⁴_{Sept. 3, '96} ¹⁵_{Dec.} states that of all the antineuralgic remedies tried by him salophen proved the most useful. This substance separates into salicylate of sodium and acetyl-paramidophenol in

the alkaline contents of the small intestine, and thus has an advantage over substances which dissolve in the gastric juice and cause derangement of the stomach. It is, moreover, odorless and tasteless.

Prophylaxis.—J. G. Sinclair Coghill, of Ventnor,²_{Apr. 6, '96} states that his experience in this connection has confirmed the opinion that in quinine we have an almost unexceptionable preventive. On the appearance of the epidemic in October, 1891, he was consulted by the principals of a large educational establishment, mostly patronized by foreign pupils, as to whether he would advise them to close the institution or could recommend some efficacious preventive. The school consisted of nineteen resident pupils, besides teachers, servants, and day-pupils. He advised that every resident inmate of the house should take immediately after breakfast a 5-grain (0.32 gramme) pill of sulphate of quinine. This injunction was strictly obeyed during the prevalence of the epidemic, with the result of complete exemption. One of the domestic servants who went to an adjacent town to attend her mother, who died of the epidemic, returned to her duties evidently suffering from it, but did not communicate it to any of the other inmates of the house.

Graeser, of Vienna,⁵⁷_{Nov. 10, '95} believes that quinine is not only a specific in influenza, but that, if given at the proper time and in large enough doses, it will prevent an outbreak of the disease. During an epidemic he administered the drug to one of every five squadrons in camp at Bonn, giving 0.5 gramme ($7\frac{1}{2}$ grains) daily for twenty-two days. Only 7 men in the squadron contracted influenza, 3 of these on the first day of the experiment; in the other four squadrons there were 22, 19, 32, and 42 cases, respectively. After the sixth day there were no more cases in the squadron taking quinine, while the disease continued among the members of the other squadrons.

Some experimental researches with regard to the prophylactic action of quinine in influenza have been made by Mossé, of Toulouse.⁹²_{Mar. 1, '96}¹⁵_{Apr.} He first of all admits that the microbe of Pfeiffer is the specific cause. He inoculated rabbits with the blood of influenza patients, with pure cultures of the microbe, and with the blood and cultures obtained from inoculated animals. Half an hour before and half an hour after inoculation he injected a solution of quinine into the veins of these animals. His results show the controlling action of the quinine on the nervous phenomena and the temperature-curve.

W. E. Green,²_{May 4, '96} when the first sign of an epidemic of influenza appeared, tried a daily dose of 1 grain (0.065 gramme) of

sulphide of calcium. All his household took it with the exception of two servants, who for some reason or other did not, the result being that all escaped but those two exceptions.

Malarial Fevers.

Pathology.—In a comprehensive review of the pathology of malaria F. A. Rogers⁹⁹_{No. 6, p. 125, '95} states that the only break in the chain of evidence which would establish, beyond a doubt, the fact that malaria is caused by a specific micro-organism is the one criterion that the parasite has not, as yet, been successfully cultivated upon artificial media. The parasites belong to the sporozoa. They are always found in the blood of persons who are suffering from malaria, and are not found in the blood in other conditions. The inoculation of a healthy individual with the blood of a person suffering from malaria produces the same disease, demonstrating that the infectious material exists only in the blood. Laveran, who, in 1880, discovered the parasitic nature of malaria, holds to the belief that it is single, and that the various forms met with have no connection with the diverse clinical phenomena found in this disease, while Golgi, on the other hand, is of the opinion that the several forms of malaria are caused by sundry different, morphologically distinct species of plasmodium. He further regards the amœba, or plasmodium malarie, to be the fundamental form of organism.

It is described as a more or less round mass of protoplasm, irregular in shape, containing no pigment-granules, and endowed with an amœboid movement, occupying a position inside the red blood-corpuscle, where, in sixteen cases, it was found by Councilman deriving its nutrition from the hæmoglobin, and that it goes through many phases of development therein, even to reproduction. Laveran contends that the fully developed organism is represented by moving filaments which are developed within small cystic bodies. After becoming detached from these they move about freely in the blood.

As all varieties of malarial disease may prevail at the same time and in the same place,—as the sequelæ of all the manifestations are identical in character, and as the acute manifestations of all varieties are amenable to the action of antiperiodic remedies,—it might be inferred that there is but one single noxious germ which, under varying conditions, causes the various forms of malaria.

Thayer and Hewitson,²¹⁶⁶_{'95} in an exhaustive monograph, give an analysis of six hundred and sixteen cases of malarial fever, with special reference to the relations existing between different types of hæmatozoa and different types of fever. The work bears

mainly upon the disease as it is met with in Baltimore, where it is rare during the winter months, but becomes more frequent as the season advances, reaching a maximum in the month of September, the majority of all cases occurring in August, September, and October. The authors conclude that any differences between the susceptibility of individuals of different ages and of the two sexes depend, apparently, only upon the varying chances of exposure to infection. The relative susceptibility of the negro is by nearly two-thirds less than that of the white population.

They were able to distinguish three varieties of the malarial parasite,—(1) the tertian parasite, (2) the quartan parasite, and (3) the æstivo-autumnal parasite. 1. The tertian parasite requires about forty-eight hours to accomplish its complete development, and is associated with relatively regular tertian paroxysms, lasting, on an average, between ten and twelve hours, associated almost always with the three classical stages,—chills, fever, and sweating. Frequently, infection with two groups of tertian organisms gives rise to quotidian paroxysms; rarely, infection by multiple groups of organisms gives rise to more irregular subcontinuous fevers. 2. The quartan parasite is an organism requiring about seventy-two hours for its complete development. It is rare in this climate, and is associated with a fever showing regular quartan paroxysms, similar in nature to those associated with the tertian organism. Infection with two groups of the parasite causes a double quartan fever (paroxysms on two days, intermission on the third). Infection with three groups of the parasite is associated with daily paroxysms. 3. The æstivo-autumnal parasite passes through a cycle of development, the exact length of which has not as yet been determined. It probably varies very greatly from twenty-four hours or under to forty-eight hours or more. But few stages of the parasite are found, ordinarily, in the peripheral circulation, the main seat of the infection being, apparently, in the spleen, bone-marrow, and other internal organs. Infection with this organism is associated with fevers varying greatly in their manifestations. There may be quotidian or tertian intermittent fever or, more commonly, more or less continuous fever, with irregular remissions. The individual paroxysms last, on an average, about twenty hours. The irregularities in temperature depend upon variations in the length of the cycle of development of the parasite or upon infection with multiple groups of organisms.

The authors were not able to separate two distinct varieties of the æstivo-autumnal parasites; more investigation is needed on the subject. The cases of malaria in the spring and early summer are of the milder, more regularly intermittent varieties (tertian

and quartan fever), the severe æstivo-autumnal infections beginning to appear only in the later summer and reaching their maximum in September. The colored race, while showing a relative insusceptibility to malarial infection, is equally susceptible to the various forms. The infections which occur, however, are more apt to take a simpler, milder course,—the single tertian cases, for instance, outnumbering the cases of double tertian fever.

The earliest cases of tertian infection are more commonly single in nature, while, as the season advances, double tertian infections become more common. Nothing has led them to conclude that these varieties of parasites are interchangeable, and the authors believe them to be distinct varieties, though closely allied to one another biologically. Combined infections with parasites of different varieties may occur, but they are rare, forming less than 2 per cent. of all the cases which they observed.

The crescentic bodies associated with the æstivo-autumnal parasite develop from the small hyaline forms. The view of Manaberg, that they are the result of conjugation, was not supported, and the authors have never seen sporulating forms, which they believe are developed from crescents. That these are degenerate forms is still undetermined. The same is the case with the nature of the flagellate bodies which may develop in all types of malarial fever. The specific action of quinine upon these three varieties of the parasite is undoubted. It exerts its influence most strongly when the parasite is undergoing the process of segmentation, before the entrance of the fresh segments into new red corpuscles. It is best administered, then, just before the beginning of a paroxysm, if we wish to obtain the greatest effect with a single dose. The action is much more rapid and certain in the tertian and quartan fevers than in the æstivo-autumnal infections.

Manson, of London, ²_{Dec. 8, '94} divides the life-cycle of the malarial parasite, as exhibited within the human body, into “(1) minute nucleated bodies, or spores, which are free in the blood; (2) small epi- or intra- corpuscular bodies, presumed to be these spores which have become attacked or have attacked the red corpuscles; (3) large intra-corpuscular pigmental amœboid bodies; (4) sporulating intra-corpuscular forms known as *corps en rosace*, or rosette bodies; (5) the last-mentioned, outside the blood-corpuscles, breaking up and becoming resolved into the first-mentioned, or free, spores; (6) intermediate forms which serve to connect these types, and suggest, if not prove, that together they form a complete vital cycle.”

Charles Lester Leonard, ⁴⁵¹_{May, '96} in a demonstration of the endogenous formation of the malarial parasite, states that the life-cycle

of the malarial parasite has never been absolutely demonstrated, although the results obtained by competent observers in different parts of the world prove, almost beyond a doubt, that it is an hæmatozoön, polymorphic in character, possessing the property of reproduction and complete development within the human body, and of passing through a definite vital cycle again and again. The series shown by means of photomicrographs taken from fresh specimens kept at the body-temperature and examined and photographed upon a warm stage demonstrated the endogenous formation of the free, non-pigmented, hyaline, amœboid malarial parasite, proving that it is derived from the free pigmented form, and that it is consequently the primary form, or first stage in the vital cycle. The free, pigmented form, or mother-cell, is shown to be one of the last stages of the cycle, although it may be but one of the modes of reproduction. The rosette form is probably a mode of transition from the intra- to the extra- corpuscular form. Although this is but one step in the cycle, the positive proof which it affords of that step makes its value greater, establishing, as it does, the polymorphic character of the hæmatozoön and making the probability of a life-cycle almost a certainty.

[In connection with a comprehensive study of tropical malarial fevers, Van der Scheer, of Java, ²⁰_{Jan. 4, '95} publishes the annexed reproductions of malarial plasmodia. Figs. 1 and 2 represent the tertian plasmodium as observed by him; Fig. 3, the sporulation form of the same plasmodium; Fig. 4, the rounded form of quotidian plasmodium. Fig. 5 shows a fresh preparation of the crescent form and Fig. 6 ovoid capsules with double-contracted borders.]

Manson, ⁶_{Aug. 8, '95} in a more recent communication, considers the development of the organism outside the body. The intra-corpuscular elements being destined to carry on the life of the parasite within the system, the point studied is the manner in which the flagellate forms, which are only met with outside the body, escape from the circulation. The author quotes the labors of Ross to show that the mosquito is, probably, an intermediate host of the parasite. This observer has found that the parasites are able to resist destruction in the stomach of this insect, and passing thence into the blood occur much more frequently in the flagellate form than in blood drawn from the finger of a patient with malaria; its development in the intermediate host is also evidenced by the fact that the crescent forms all become spheres. He explains the communication of the disease from the insect to man by supposing that the parasites on the death of the mosquito are added to water or soil, and by that means are carried into

the human body. Manson concludes that the parasite must have some third form, not yet discovered, in which it can remain latent in the body for a long time, until the conditions favorable for its development occur, at which time the patient develops an attack of fever. An interesting point in the microscopical technique contributed by the author is that the flagellated body never appears or comes into view on the microscope field immediately after the withdrawal of the blood from the vessels of the body, but only after the blood has been on the slide for some minutes—generally not before a quarter of an hour.

Danilewsky⁵⁰ Sept. 19, '95; Nov. 30² describes certain parasitic forms hitherto unnoticed, which in the course of his studies of malarial blood he found in cases of protracted infection. 1. Pseudocytes in leucocytes: These occurred in a case of quotidian fever of several months' duration and after the ordinary forms of the malarial parasite had disappeared. The pseudocyte, which was spherical with distinct contour, inclosed many fine grains—not melanin—in rapid molecular movement; it occupied about one-third to one-half of a large leucocyte. Methyl-blue and gentian-violet stained the organism, though faintly. Apparently it was the remains of a disintegrating leucocytozoön. Danilewsky has seen similar bodies in the blood of birds and reptiles in company with the better-known hæmatozoa. 2. Leucocytozoa(?): Round, grayish, faintly-granular bodies, with sharp, regular contour, containing (*a*) a granular, rough, and sharply-defined little body, suggesting a deformed and shriveled nucleus, and (*b*) a sharply-outlined sphere. These bodies were found in the blood of a patient who had been suffering from continued fever for several weeks. 3. Unusually large malarial crescents, which might very well cause serious nervous trouble by plugging the vessels of the medulla: They were from 20μ to 22μ in length—two and a half to three times the length of a blood-corpuscle—and from 4μ to 6μ in breadth. These parasites were free, motionless, slightly bent, with one end narrower than the other, and they contained a wreath of melanin about the centre. The presence of pigment proved that the body had been formed originally in a red blood-corpuscle like the ordinary malarial crescent. 4. Intra-cellular crescents (8μ to 10μ by 3μ to 4μ), one end stumpy and broader than the other, and the usual melanin clump at the middle. But, besides this crescent, the affected corpuscle contained a small, dark, round, little body, free, but lying against the centre of the crescent. This form occurred in the same patient as the preceding. The crescent was of the usual malarial type, but the small, free body is quite unusual and could not be explained. Other writers—Canalis, Celli,

Fig 1

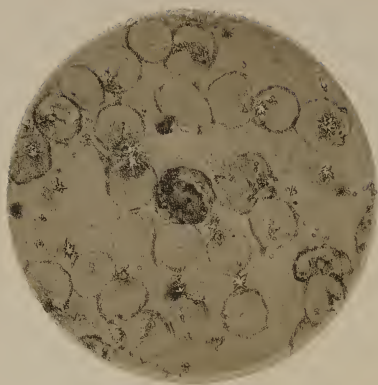


Fig 2.

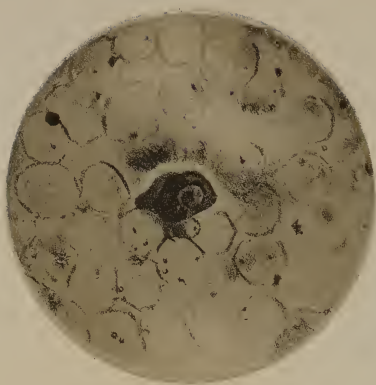


Fig 3.

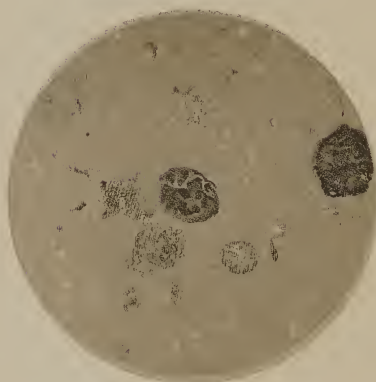


Fig. 4.

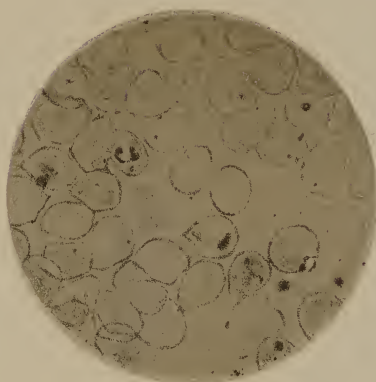


Fig. 5.

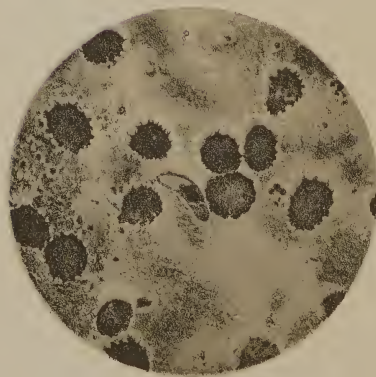
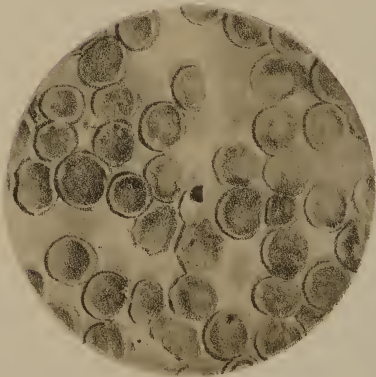


Fig. 6.



Malaria Plasmodiæ (Van der Scheer)

Virchow's Archiv.

Guarnieri, and Mannaberg—depict similar bodies without advancing any satisfactory theory as to their origin and nature. They are not buds thrown off by the crescent.

Di Mattei,³²⁴_{B.22,H.3; June,'95} after a series of experiments, concludes that malarial infection can be brought about in men by both intravenous and subcutaneous injection. In the latter case not less than 2 cubic centimetres (31 minims) of blood should be injected. The time of incubation varies, but is usually between ten and fourteen days. Tertian, quartan, and irregular fevers are due to three different parasites, and the injection of blood containing one variety reproduces the type of the primary case and with similar organisms in the blood. Inoculation from cases of mixed infection produces correspondingly atypical diseases. If the organisms of one type are injected into the body of a person with a fever of different type, the course of the disease may be changed. Inoculation with the blood of a malarial man cannot reproduce the disease in a lower animal,—all kinds of animals, including monkeys, having been tried. The parasites found by Danilewsky in birds, and claimed by him to be identical with human malarial protozoa, have analogies with the latter, but are essentially different from them. They cannot be grown in the human body; they do not produce similar changes; they are not affected by quinine or arsenic.

J. H. Kellogg,⁸⁵⁵_{Oct., '94} considers the question of the toxins of malaria. He observed that, during an attack of malarial fever, the urine is always more toxic than in the normal state. The degree of toxicity was practically the same before and after the paroxysm, being 0.76 before and 0.78 after, this being far above normal. During the paroxysm, however, there is a much greater increase in the toxicity, amounting to more than five times the normal. In the author's opinion the conclusion from these observations seems very clear and positive. A toxic substance is produced in malarial disease, which is eliminated in greater quantity during the febrile than during the non-febrile stage.

Von Limbeck,⁵⁷_{Dec.9,'94} examined the urine in two cases of malaria, finding that, as in all febrile affections, the elimination of nitrogenous and ammoniacal products was increased,—certainly not diminished, as sometimes affirmed. The reduction of the phosphates has no particular characteristic that could be relied on in malaria. The increased production of the chloride appeared to compensate for the vicarious retention of the phosphate. The excess of NaCl in the urine during chills was also diagnostic of malaria. Picci and Bernasconi,¹⁷_{Oct.23,'94} noted an increase of phosphoric acid in the first twenty-four hours of infection.

In tertian cases of malarial fever, J. S. Billings, Jr., ⁷⁶⁴_{Oct., '94} has noted a uniform diminution in the number of the leucocytes during the febrile paroxysm. The maximum number of leucocytes is found, as a rule, two or three hours after the chill. There then follows a progressive diminution until the minimum number of leucocytes is reached at the end of the paroxysm, when the temperature is subnormal. The number of leucocytes then rises somewhat, and during the interval occupies a position about midway between the maximum and minimum above mentioned. While the occurrence of a leucocytosis in most secondary anæmias is the rule, it is never very marked in malarial anæmia, rarely being above 15,000 to 18,000. In four cases which were under observation the increase in the number of leucocytes was striking. In two cases where the red corpuscles ranged just above 3,000,000 per cubic millimetre the leucocytes were 28,000 and 30,000, respectively. In another case the red corpuscles were just under 2,000,000, while the leucocytes reached 40,000. In the fourth case the red corpuscles were 3,600,000,—a relatively mild anæmia, —while the leucocytes ranged above 20,000 for a week. In all four cases the increase was solely in the polynuclear leucocytes.

Nepveu ⁴⁶_{Nov. 15, '96} states that one of the most curious lesions of acute malarial fevers is the presence of a considerable number of granulations in the walls of the capillaries and of the smaller vessels of the outer layer of the pia mater. These granulations are placed around the nuclei of the vascular endothelium in some cases, in others in the tunica externa of the smaller vessels, and in others, again, around the non-striated muscular fibres. The largest equal a nucleolus in size, but vary considerably from the smallest to the largest. They are numerous, and are in some places collected in groups of twenty to thirty or more, and in others are almost isolated. There is no double outline; osmic acid does not affect them; they are stained by fuchsin and by Zeihl's solution, especially when it is weak.

Complications.—J. M. Anders, of Philadelphia, ⁶¹_{June 15, '96} analyzed 1780 cases of malaria with reference to complications which were noted in 189 instances, or 10.7 per cent. The cases were classified into: intermittent fever, 1434; remittent, 74; malarial cachexia, 27; chronic malaria and irregular types, 22; unclassified, 222. All instances in which an element of doubt existed were eliminated. The author concludes that the complications of malaria, while as frequent as those of some of the other acute infective diseases, are somewhat peculiar in character, and on the whole not grave in nature. Prominent among these complications are cardiac affections, enteritis, neuralgia, albuminuria, pleurisy,

rheumatism, pulmonary tuberculosis, typhoid fever, etc. As to pulmonary affections Anders supports the view that malaria promotes the development of pulmonary tuberculosis, while pleurisy is more frequently due to secondary infection, and is to be regarded as a genuine complication. Among the 1780 cases of malaria analyzed there were only 5 of lobar pneumonia and 1 of catarrhal pneumonia. The relationship between malaria and typhoid fever and the presence of both diseases in one individual are due to the simultaneous presence of two pathogenic organisms. A careful blood examination in cases of suspected typho-malarial fever would show many to be instances of pure typhoid fever, chills and sweats and intermittent temperature-curve being sometimes observed in typhoid. When the temperature-curve is of the intermittent type from the commencement, the course of the affection is usually favorable.

A. J. Weatherly, of Kurseong, ^{Feb. 2, '05}₅₉ adduces figures taken from the records of his experience in Africa, Florida, and India, which show the effect of malarial poisoning in causing abortion. In the unhealthy parts of these countries abortions are to labors at term as about one to two (about one to five is the usual proportion). Weatherly has found, moreover, that this is not due to the systemic disturbance of malarial fever, for the abortion often does not take place during an attack of fever, and in many cases the effect of malaria is only manifested by the habit of aborting. Sterility is, he believes, more frequent in malarial districts than in others; if women live too long in a malarial district the sterility becomes permanent, but if they leave after living there a certain period they may become pregnant. He has observed that the same thing is well known to the natives to hold good of their sheep and cattle. They send their stock inland to breed, and only bring them down into the malarial district for the purpose of fattening. The administration of quinine to pregnant women in malarial districts rather tends to ward off abortion than to bring it about.

Diagnosis.—Wm. Osler, of Baltimore, ^{Jan. 12, '06}₅₉ discusses the errors of diagnosis which may arise from the presence of chills, which differ very much in their etiology, but may be divided into two main groups: (1) those from sudden shock to the nervous system and (2) those from absorption of the toxic material formed by organisms. In so-called nervous chill fever is absent. In the second group there is always fever. The nervous chill is that met with in gall-stone colic or in the passage of a catheter. This initial chill is without fever, but subsequently, of course, there may be chills with fever due to infection. The disease most often asso-

ciated with chills is malarial fever, and here the chill is of a characteristic kind; so that the name "chills and fever" is synonymous with malaria. The two important diagnostic points in malaria are the invariable association of the plasmodium of Laveran and the invariable curative effects of quinine. It may be said that within forty-eight hours the chill will cease in genuine malaria if quinine be used.

Chills cause errors in diagnosis in various affections. In tuberculosis the error may be made early or late in the disease, for it is at the two extremes of pulmonary tuberculosis that we have chills. These are a special feature of the early stages of tuberculosis. He has had many cases of early phthisis brought to him as malarial fever. Errors occur frequently in regions where paludism is common. Then there is the large group of septic processes with fever, such as abscess of the liver, which is a common cause of chills and fever in this latitude. There are very few cases of abscess of the liver which are not at first regarded as malarial fever, and thus much valuable time is lost in the treatment. Malignant endocarditis is another disease which is often treated for malaria. A not frequent source of error is the chill following and associated with pleurisy of a tuberculous form and empyema following the infectious diseases, as scarlet fever, etc., and following the formation of pus. The chills in typhoid fever are of the greatest importance, and have attracted attention for years. They occur in 2 or 3 per cent. of all cases, and are often due to the powerful antipyretics given. He had seen cases in which chills and fever had followed a large dose of antifebrin. In certain affections of the urinary passages, and more especially in pyelitis, chills occur which are often obscure. In chronic obstruction of the common duct by gall-stones there is the condition called by Charcot hepatic intermittent fever due to catarrhal cholangitis. In new growths of various kinds, as in cancer of the stomach, in Hodgkin's disease, and lastly in syphilis, errors as to the nature of the fever may be made. The important aids in the diagnosis of chills are quinine and the examination of the blood.

Treatment.—The late Dujardin-Beaumetz ⁶⁷³_{Apr., '95} having announced to the Société de Thérapeutique of Paris that the soldiers about to be sent to Madagascar by the French government were to carry with them, for prophylactic purposes, a considerable quantity of quinine, and that it would be desirable to know if one of the salts of that drug were preferable to another, and also which was the most suitable pharmaceutical form for administration, the society appointed a commission to investigate the subject. The results of their studies are embodied in the following conclusions:

1. Solutions of quinine salts should be reserved for the attacks of fever. 2. The basic quinine hydrochlorate is to be preferred as a prophylactic measure, as being sufficiently soluble and containing the largest quantity of the alkaloid. It is also less irritating to the digestive passages than the sulphate. The hydrobromate should be employed in rebellious cases of fever in which the sulphate has failed. 3. The compressed preparations should be absolutely rejected; pills made with a soluble excipient or gelatin capsules seem to be the preparations of choice in preventive treatment. 4. Two pellets or gelatin capsules containing 0.25 gramme (4 grains) of the hydrochlorate may be given daily, one in the morning and one in the evening, or before the meal, a small quantity of liquid being taken at the same time. This quantity will be sufficient to maintain the organism continually under the influence of the quinine. 5. Whatever pharmaceutical form be adopted, it is indispensable that complete solubility be assured.

[As a prophylactic, the quantity here recommended is efficient and at times may be increased. The doses recommended by many authors (4 to 6 grains—0.25 to 0.40 gramme—daily) will frequently prove entirely useless.—J. D.]

L. Cendero, of Elobey, ⁹¹⁷_{Aug., '95} as garrison surgeon in a region where malarial fever spares no one, tried valerianate of quinine as a prophylactic under strict surveillance in the corps under his care. Out of 30 men 23 were given the drug regularly every day in the author's presence. The 7 untreated suffered from fever, while those treated remained entirely free.

Williams, of Boston, ⁹⁹_{Nov. 15, '94} relies upon the temperature as a guide to the use of the drug, following Dock's method, by which 15 or 20 grains (1 to 1.3 grammes) of quinine in solution are given in the cases during the decline of the temperature, and repeated on the seventh, fifteenth, and twenty-second days without reference to the temperature. If a rise in temperature occur on the first or second day after the first dose is given, a second dose of 10 to 15 grains (0.65 to 1 gramme) is administered when the temperature is falling.

Triantaphyllides ³_{Oct. 3, '94} states that in recent neurasthenic cases from malaria recovery can, as a rule, speedily be obtained by hypodermatic injections (1 in 4) of hydrochlorate of quinine in doses of 0.60 to 1 gramme (9 to 15 grains). In cases of relapse a large number of injections is required. In inveterate cases sulphate of cinchonine given by the mouth or hypodermatically, or sulphate of cinchonidine, together with tonic measures, wet packing, and especially sea-bathing, has often been successful in the author's hands.

A. Robin, of Paris, ⁶⁷³_{Aug., '95} finds that, while sulphate of quinine is often without effect in congestion of the liver of malarial origin, cinchona gives good results when associated, in a prolonged course of treatment, with arsenic, iron, and hydrotherapy.

Aufrecht ¹¹⁶_{July, '95} having found, in common with many other authors, that tablets of quinine frequently pass through the digestive tract without being absorbed, advocates the use of neutral tannate of quinine for prolonged use. It has scarcely any taste, and, as it contains three times less quinine than the hydrochlorate, larger doses must be given. He has found the following formula very efficacious in inveterate cases:—

R Arsenious acid,	. . . . .	0.05 gramme ($\frac{7}{8}$ grain).
Hydrochlorate of quinine,	. . . . .	2.00 grammes (31 grains).
Glycyrrhiza-powder,	. . . . .	3.00 grammes (46 grains).
Glycyrrhiza-juice,	. . . . .	q. s.

To make 30 pills.

Sig.: Two pills three times a day.

[I heartily concur with Aufrecht, that quinine should never be given in the form of tablets. The ordinary pill of quinine—especially when sugar- or gelatin- coated—I have frequently discovered in the alvine discharges *unchanged*. I consider the bichloride of quinine the best and most soluble form. It may be given in *freshly-made* gelatin capsules, but the cachets of the French—concave, paper-like discs made of rice-flour—are the best. The finely-powdered bichloride of quinine may be placed therein, sealed, and, when dipped in water for a moment, becomes soft and semigelatinous and is readily swallowed. Two, five, or ten grains (0.14, 0.35, or 0.65 gramme) of this alkaloid may be taken at one dose, and without difficulty. It is important that the stomach should contain food, which aids in two directions: first, by preventing the quinine from coming into direct contact with the gastric mucous membrane, to which, when locally applied, it is an irritant, and, secondly, the presence of food excites the secretion of free hydrochloric acid, thus aiding in securing complete solution of the salt. After each dose of quinine it is desirable to administer 5 drops of pure hydrochloric acid well diluted, or to follow the practice of the profession in the South, by advising the use of lemons, oranges, or other fresh fruit, the organic acid in each accomplishing the same purpose.—J. D.]

Moscucci ⁵⁰⁵_{No. 66, '95} treated two cases of malarial fever by means of analgen in daily doses of 1 to 2 grammes ($15\frac{1}{2}$ to 31 grains), administered a few hours before the attacks. The splenomegalia present was cured in a month by means of an ether-spray applied over the spleen, the tumor rapidly diminishing in size and the pain immediately disappearing.

When migraine in children is believed to be an expression of chronic malaria, as evidenced by an enlarged spleen and previous history, McKee, of Philadelphia, ¹¹⁹_{June 22, '95} finds that the exhibition of arsenic gives better results than any other remedy. The author administers liquor potassii arsenitis in large doses over an extended period of time, watching, of course, for the physiological effects of the drug.

C. J. Proben, of New York, ¹_{Apr. 6, '95} reports a case of floating spleen in an infant following malaria. Laveran's plasmodia being found in the blood, the child was given 6 grains (0.40 gramme) of sulphate of quinine three times daily, alternately with full doses of arsenic. Prompt improvement was seen with diminution of the spleen, and two months after treatment began the organ was found free in the abdomen, about twice its normal size.

Benjamin Brodnax, of Broadnax, La., ⁷¹_{Apr., '95} recommends that acetanilid should be used instead of quinine. The author states that he has treated several hundred cases in this way, and always successfully. If there is time before the chill, he gives from 1½ to 2 grains (0.09 to 0.13 gramme) of calomel in ¼-grain (0.015 gramme) doses, half an hour apart; after which, whether the bowels have moved or not, from 2 to 6 grains (0.13 to 0.40 gramme) of acetanilid, according to the age of the patient, are given twenty minutes or half an hour before the approach of the expected chill.

Crespin, of Algiers, ⁶⁷_{Aug. 15, '95}; ⁶⁷³_{Nov.} has tried pambotano (*Callandra Houstoni*) in a great many cases of malarial disease and finds that it is often successful when quinine and other remedies entirely fail. It is especially successful in the quotidian, intermittent, and simple continued forms, and also in chronic malaria; but in bilious, pernicious, and neuralgic attacks it gives no marked result. In most cases it caused an increase of appetite, the drug appearing to be a powerful stomachic, superior in this respect to quinine. Pambotano appears to have no specific effect on the malarial phenomena, but apparently acts by improving the general health, thus favoring the elimination of infectious elements by the skin. This discharge is almost entirely cutaneous, explaining the success of the remedy in various infectious diseases, as influenza and typhoid fever. The author used a decoction of the root or an elixir, giving 80 grammes (2½ ounces) of the former, in eight doses within twenty-four hours, to an adult, and half that dose to a child.

H. A. Hare and Wilmer Krusen, of Philadelphia, ⁸⁰_{May 15, '95} present the results of a collective investigation, based upon one hundred and seven replies to questions as to the treatment of malarial hæmaturia, the area covered being that having a death-rate from

malaria of 70 per cent. or over. Thirty-two remedies were used; the first six were calomel, tincture of ferric chloride, arsenic, ergot, turpentine, and sodium hyposulphite, each remedy being used by ten or more physicians. Calomel is used in 5-grain (0.31 gramme) or even much larger doses, and seems to be most in favor. Tincture of ferric chloride is used either alone or combined with arsenious acid or small doses of quinine. Arsenic is recommended in from 1- to 5-drop doses (Fowler's solution); the only caution stated is that the urine shall be clear. Sodium hyposulphite may be given in from 20 to 40 grains (1.3 to 2.6 grammes) every three hours, after thorough purgation with calomel. Ergot is regarded as an hæmostatic. Turpentine, in capsule, 10 drops every three hours until the urine clears, and a turpentine liniment in the lumbar region, may arrest renal hæmorrhage.

[The failure to dwell upon the importance of quinine is evidently an accidental omission. This drug, in full antiperiodic doses, often produces brilliant results.—J. D.]

Bilious Hæmaturic Fevers.

Steudel,⁶
July 27, 1906 in a paper on the bilious hæmaturic fever of Eastern Africa, states that in twelve cases he made an examination of the blood by means of Fleischl's hæmometer, and found that the amount of hæmoglobin present oscillated between 50 and 21 per cent. of the normal standard. In two other cases the quantity was too small to be determined by the instrument, but it was estimated by the observer at not more than 5 and 8 per cent., respectively. He lays stress upon the prognostic value of hæmatological examinations, and furnishes details regarding two patients with a deficiency of hæmoglobin in their blood, in whom bilious fever subsequently showed itself on several occasions when their ordinary mode of life underwent a change for the worse. The author looks upon the diminution of hæmoglobin as a certain index of latent or incipient malaria, and is satisfied that this important sign manifests itself long before the more salient symptoms become apparent. As long as the impoverishment continues slight the sufferer can be restored by appropriate treatment on the spot, but as soon as it passes certain limits he should at once be invalided to Europe or, at all events, sent to a sanatorium.

In one case, where the hæmoglobin was reduced to less than 8 per cent. of the usual amount Steudel had recourse to transfusion of blood with conspicuous success, the supply of vital fluid being furnished by a young negro. Almost immediately the percentage of corpuscles rose to 20, and eventually the patient made a good recovery. Transfusion in malarial affections does

not seem to have been often essayed, and yet, in the rare cases that are recorded, the effects of fresh blood are said to be highly satisfactory. According to the Italian school, the physiological solution of chloride of sodium gives just as good results as the arm-to-arm procedure, if not better, but exact data with regard to the entire subject are still wanting.

Steudel alludes to an interesting point bearing on the etiology of paludism. Bilious fever seldom or never attacks men when they are on the march or engaged in any occupation necessitating hard work. The disease waits, as it were, until they are enjoying an unguarded repose before exciting its pernicious influence. In the author's opinion, the reason of this is that so long as the body is maintained in a state of activity the products of disintegration are completely eliminated as soon as they are formed; whereas during inactivity the blood becomes more or less charged with detritus, which serves as a nidus for the paludal poison.

[If the author had employed *four* pipettefuls of blood in the demicylinder of distilled water in determining the percentage of hæmoglobin by the Fleischl hæmometer, and had divided the result by four, he would have obtained a correct reading, even though the amount of blood-pigment was reduced to 5 per cent. It is well known that the Fleischl hæmometer is inaccurate for blood containing less than 15 or 20 per cent. of hæmoglobin.—J. D.]

Black-water Fever.

Plehn, ⁶_{May 18, '06} medical officer to the colonial government of Cameroon (West Coast of Africa), has made valuable researches on the etiology of black-water fever. In a communication to the Berlin Medical Society he states that Europeans and Chinese are particularly subject to this complaint, negroes, some cases excepted, being exempt. Robust persons, both men and women, are especially liable to be attacked. The duration of the incubation is very uncertain. Black-water fever nearly always follows typical malaria; Plehn has seen only three cases of the disease without antecedent malaria. The disease is apt to break out after hard work or mental excitement. Microscopically he had observed a diminution of the red blood-corpuscles, and that they often assumed the form of macrocytes, but seldom that of poikilocytes. By means of staining methods he had recognized in the blood plasmodia similar to those of malaria, but with a less affinity for aniline colors. He believes that the plasmodium of malaria and of black-water fever are varieties of the same species. Drugs are unnecessary, the disease having a tendency to spontaneous recovery.

Sleeping Sickness.

Charles Forbes²³⁹
June 1, '96 in a valuable paper gives an account of this peculiar African disease. In this, as in almost all the disorders met with in the tropics, poisoning by the continual absorption of the malarial protozoön must be taken into consideration, and its powerful effects on the trophic nervous system borne in mind. Interference with the blood-current and the production of toxins, etc., are all elements taking part in the production of the main symptom from which the disease acquires its name. Forbes found, post-mortem, the following morbid changes: Hyperæmia of the arachnoid membrane, with slight signs of chronic inflammation in the other meninges. There was no special accumulation of fluid in the ventricles of the brain nor in the subarachnoid space, etc. The brain-substance in every case was somewhat paler than normal, pointing to existent anæmia of the cortical centres. The spleen was enlarged in one case, but the author considers this as due to malarial taint. The enlargement of the cervical glands was well marked in every case. There was seen, on section of these glands, increased formation of the connective-tissue elements, with atrophy of the active gland-cells. In two cases the blood showed the presence of *filaria sanguinis hominis*, major and minor.

The following treatment has proved, in the author's experience, the most applicable in all tropical countries: At the onset he gives 2 compound cathartic pills at bed-time, and repeats the dose whenever it is necessary. Twice a day $\frac{1}{60}$ grain (0.0011 gramme) of strychnine is given by the mouth if the patient is awake and subcutaneously if he is asleep. These doses are occasionally alternated with digitaline tabloids containing $\frac{1}{100}$ grain (0.00065 gramme). Even when the patient is moribund a tabloid of strychnine nitrate containing $\frac{1}{15}$ grain (0.004 gramme) will rouse him. Twenty drops of ether injected over the cardiac area may also prove useful. The diet should be largely composed of meat, and stimulants, such as whisky, may be allowed.

Yellow Fever.

According to Joseph Jones, of New Orleans,⁶¹
Mar. 10 et seq., '96 the alterations of the blood in yellow fever consist chiefly in: 1. Such an alteration of the chemical and physical properties of the fibrin and albumin as leads to the transudation of the latter through the excreting structures of the kidney. 2. Various degrees of alteration and diminution of the fibrinous element. In some cases there is an almost entire disappearance of this substance. This disappearance seems to be due to the direct action of the febrile poison, and

not so much to the action of ammonia. From this alteration in the amount and character of the fibrinous element it results that the blood coagulates imperfectly and the clot is voluminous and soft. 3. While the red blood-corpuscles are very slightly diminished in yellow fever they present under the microscope certain peculiar appearances, which seem to be referable to the action of extraneous matters of the blood. 4. Increase of the extractive matters of the blood. 5. Increase of the fatty matters. 6. Accumulation of bile in the blood in consequence of the profound lesions of the liver induced by the febrile poison, and in consequence of the failure of the excretory function of the kidneys. Many of the changes of the blood, as well as certain cerebral symptoms, may be dependent upon the presence and action of the biliary constituents. The serum presents a golden color, this being due to the presence of bile. 7. Accumulation of the urinary constituents, and especially of the urea and phosphoric acid, sulphuric acid, chloride of sodium, and carbonate of ammonia, in the blood consequent upon the profound lesions induced by the febrile poisons and their products upon the kidneys. 8. Rapid dissolution of the colored corpuscles after the blood is abstracted from the body either during life or after death. 9. Rapid putrefaction of the blood of those suffering from yellow fever after its abstraction from the living body or from the large vessels after death.

[The rapid dissolution of the blood and consequent deposition of pigment is, probably, chiefly due to the presence of bile in the plasma. One of the best methods for obtaining hæmatin crystals from the blood is by the addition of bile.—J. D.]

Charles Finlay, of Havana, ³⁶_{Oct., '94} explains as follows his theory of the transmission of yellow fever by the mosquito: The female mosquito having introduced its lance into the skin of a yellow-fever patient through one of its pores (excretory ducts of the sebaceous or sudoriparous glands), pierces one of the blood-capillaries and fills itself with blood. In so doing the transverse ridges and the terminal teeth that exist on the outside of the compound lance of the insect are supposed to pick up some of the disease-germs contained either in the blood itself, in the walls of the capillaries, in the connective tissue, or in the excretory duct of the cutaneous glands through which it has penetrated. After this operation the lance is withdrawn within its sheath, and the mosquito, weighted by the blood, seeks some dark corner where it may hide and digest unmolested the blood that it has sucked. Forty-eight hours in summer and three to five days in winter are required for this digestion, during which time the insect persistently

refuses to sting again, though it is always ready to suck, with the point of its proboscis, at any particles of sugar that may be within its reach. The female mosquito has generally been fecundated before it begins to sting, and will, therefore, seek some pool of stagnant water or neglected bucket in the open air, where it may lay its eggs. The day mosquito never lays its eggs in the manner described in books, but scatters them, besmeared with a glutinous substance, over the surface of the water or upon the sides of the tank or vessel. Its color is black or steel; there are five white rings on its hind legs and others on the middle and front ones; its wings are so short that they do not cover the anal segment of its body. In all these particulars it differs from the night mosquito, which is larger in size, of a uniform yellowish-brown color, lays its eggs like the European *Culex pipiens*, and has longer wings. The nocturnal species can seldom be made to sting more than once. The *C. mosquito* may be kept alive during thirty-five days in a very small space, and with a very scanty supply of air, provided it is allowed to fill itself with blood every two or three days, or if only some dry sugar and a supply of fresh water are placed within its reach. In the author's inoculation experiments the interval between the application of the contaminated mosquito to a susceptible person and the appearance of the first symptoms of a mild attack of the disease (when such a one did occur) varied between five and twenty-five days, the latter term being the one fixed upon beyond which any morbid symptoms would be considered as independent of the inoculation.

Variola.

Pathology.—George Dock, of Ann Arbor,²³⁴_{Dec., '94} considering the relations of variola, varioloid, and vaccinia, states that the claim that the causes of small-pox and vaccinia are bacteria seems quite impossible in the light of all the investigations so far made. The view has long been held by some of the most able bacteriologists that the causes of these diseases, as well as those of the other eruptive fevers, would be found to be protozoa. The author alludes to the investigations made within the last few years which are claimed by their authors as proving this belief. But he remarks that the bodies described are suspiciously like some of the alleged cancer parasites, which are certainly not parasites; still this resemblance does not make it certain that the *Cytoryctes variolæ* are also spurious parasites. The history of malaria has shown that the most experienced microscopists could be in error regarding the existence and nature of bodies not very unlike the supposed variola and vaccine protozoa. Even if the bodies are found to be

organisms, however, and to have causal relations with the diseases in which they occur, the pathology of small-pox and vaccinia will not be fully explained.

Von Sicherer ³⁴_{Aug. 29, '95} confirms observations first made by Guarneri, who found that in certain animals the cells of the corneal epithelium which form the boundaries of a vaccination wound always contain intra-cellular parasites, belonging, like those of malaria, to the sporozoa. These parasites are visible by the end of the second day after vaccination. In an hæmatoxylin-stained section they appear as small, deeply-stained, round bodies, which lie for the most part in the protoplasm of the epithelial cells, close to the nuclei. Around each parasite is a narrow, clear space. They cannot be mistaken for leucocytes, for they are present before the latter have reached the injured spot. Thin, fresh slices of the vaccinated cornea, when examined on the warm stage, show the parasites as small, bright bodies moving within their host-cells.

J. J. Clarke ²_{Oct. 20, '95} inoculated the cornea of a rabbit. Forty-eight hours after vaccination the rabbit's cornea in and about the seat of inoculation showed the deeper epithelial cells to contain dense, highly-refracting particles, which lay close to the nuclei. They stained with acid hæmatoxylin, but showed a preference for such stains as eosin, carmine, and fuchsin. These intra-cellular bodies, even at this early period, afforded evidence of organic processes. Some were dividing into two similar parts; others were enlarged and showed a central, denser spot. Others, again, showed a middle, reticulated zone. On the third day some of the intra-cellular bodies had divided into a number of segments, and many of them had escaped from the host-cells. Some of these free bodies showed a distinct "peripheral granule-layer," such as the author had demonstrated in the cell-inclusions of cancer; others were large and of a round, oval, or pyriform shape; still others had subdivided into segments, some of which contained nuclear matter, either in the shape of small masses or suggesting radiating bars. Thus, these organisms—for their structure enabled them to be recognized as such—presented a series of forms which afforded an exact homology with the bodies described by the author as sporozoa in the so-called "psorospermiosis" of the urinary tract, squamous epithelioma, cancer of the breast, uterus, etc., and various sarcomas. Vanderloeff and L. Pfeiffer had described motile, flagellate bodies in the blood in the early fever of variola and vaccinia. Histological examination of variola showed parasites indistinguishable from those of the vaccinated cornea, where the parasites were easily distinguishable from leucocytes, degenerated epithelial cells, etc.

Copeman and Klein³⁶⁴_{Sept. 2, '95} have shown, with reference to vaccinia and variola, that, in specially stained preparations of vaccine-lymph taken antecedent to full maturity of the vesicles, a minute bacillus can be demonstrated in considerable numbers. This organism, however, cannot be grown on any of the ordinary media. By inoculating eggs with variolous crusts obtained from the small-pox hospitals and keeping them at blood-heat for a month, the contents became transformed into a creamy material which contained an organism resembling the one found in the vaccine-lymph. Moreover, calves inoculated with the creamy material from the inoculated eggs developed vesicles from which children were vaccinated. They developed typical vaccinia.

J. Christian Bay, of Des Moines, Iowa, ⁹_{Jan. 26, '95} describes the *Dispora variolæ*, an organism discovered by himself, which he considers to be the specific cause of the disease, and presents the same appearance as the one described by Plaut. It is a colorless, non-motile bacillus, with a long diameter measuring from 0.6μ to 1μ , and the short diameter from 0.2μ to 0.3μ , showing spores, one at each end, early in its development. It was found in 62 out of 65 cultures from vaccine-points and in one case in the lymph from a case of confluent small-pox. Of 40 cultures in bouillon made from this lymph only 2 failed to show the presence of the bacillus. Bay believes that the spores are the main source through which both variola and vaccinia are reproduced.

Auché and Jonchères, of Bordeaux, ⁹²_{June, '95} ⁶⁷³_{Sept.} find that the quantity of urine in discrete small-pox varies in different patients, from 600 to 1400 cubic centimetres (19 to 45 fluidounces) in the stage of suppuration to from 800 to 2000 or even 2600 cubic centimetres ($25\frac{1}{2}$ to 64 or even 83 fluidounces) in the period of defervescence. The urinary curve is much more regular; relatively high at the period of eruption, it falls at the stage of suppuration and becomes elevated at the moment of defervescence. In some patients there is a true urinary crisis. The toxicity of the urine in small-pox is about normal at the stage of eruption, diminishes, sometimes considerably, during the fever of suppuration, increases markedly during defervescence, and returns to normal in one, two, or three days. Frequently there is a veritable unloading of the urotoxic material, corresponding almost exactly to the urinary crisis. In cases in which febrile complications occur during convalescence the toxicity of the urine diminishes at first and increases again when the fever falls. The delirium of the acute period of variola is apparently a toxic delirium, and in one case the authors observed that its variations were exactly the same as those of the urinary toxicity. In hæmorrhagic variola the curve and toxicity

of the urine fall at the onset and remain lowered until death occurs.

Auché, of Bordeaux, observed an interesting case of paraplegia occurring during the course of a fatal variola. At the post-mortem examination streptococci and coli bacilli were found in the spinal cord and coli bacilli alone in several other organs. According to the author, the myelitis was secondary and due to the streptococcus.

Oetlinger and Marinesco¹²⁶_{July 6, '96} report a case of acute disseminated myelitis due to the streptococcus occurring during an attack of variola.

Bucknill²_{Feb. 16, '96} described to the West London Medico-Chirurgical Society a case of casual cow-pox which occurred in a man aged 34. He noticed a papule on the flexor surface of his left forearm two days after milking two cows; other spots followed and the pocks presented a most typical appearance. The vesicles contained clear fluid. During the first few days after the inoculation the patient complained of severe headache and general malaise; there was a deposit of urates in his urine and swelling and tenderness of the axillary glands. One of the cows was found to be suffering from bovine variola, and presented a number of dried-up pustules on the teats. All efforts to trace the origin of the disease proved abortive. The patient had four excellent marks of primary vaccination and was revaccinated after this disease, but, as was expected, without result.

Auché²_{May 18, '96} sums up the deductions to be drawn from a series of notes taken on the influence of small-pox among parents in the receptivity of their children in relation with vaccination and small-pox. Small-pox among parents is not followed by any effect on the children in respect of their receptivity to the influence of vaccination. If both parents have had small-pox before conception, the influence on the infant is not more marked than when the mother only has had the disease. Small-pox previous to pregnancy frequently renders the child immune. If small-pox attack the mother during pregnancy, different results may follow. When the child is born the period of incubation may be in progress. Small-pox is frankly manifested after a few days' interval, or the child may be born in small-pox or bearing the marks of the disease. It is refractory to vaccination. If the child has neither had small-pox during the foetal period nor been born with it, and if the birth take place while the maternal incubation period is in evolution or when the eruption is out or suppuration going on, it will be susceptible to vaccination; later on it will be immune, and this condition continues from a few months to two or three years.

Treatment.—Kinyoun,⁹_{Feb. 2, '95} of the U. S. Marine-Hospital Service, recorded the results of the employment of the blood-serum of a heifer calf, vaccinated four weeks previously, in the treatment of two cases of variola. Fifteen cubic centimetres ($\frac{1}{2}$ ounce) of the serum were injected subcutaneously when the cases came under observation and again after the lapse of eight or ten hours. In one case four injections were made, in the other seven. A careful study of the cases, individually and comparatively, led to the conclusion that the treatment exercised a modifying influence on the disease, especially on the eruption. One of the patients died, but it is believed that his life was prolonged at least seventy-two hours by the treatment. It is suggested that, as the serum appears to be capable of mitigating the attack of variola, it ought to have the power of rendering susceptible persons refractory to the disease.

Llewellyn Eliot⁹_{June 29, '95}; ⁴⁵¹_{Aug., '95} refers to the experiments of Sternberg as to the power of blood-serum from an immune calf or from an individual who had recently suffered from variola, if injected into the subcutaneous tissues at the time of the vaccination, to prevent the development of a characteristic vaccine-vesicle. In these, negative results were obtained; nevertheless Sternberg questions whether at the time a sufficient amount of the serum had been injected. Accordingly, at the request of Kinyoun, who supplied him with serum from a calf recently vaccinated, but at the time perfectly well, he treated, during the recent epidemic, five cases of small-pox in hospital by this method. Four cases made excellent recovery; one, of very malignant type from the first, died. He gives the details of the cases and thinks, so far as he can judge from such a limited experience, that serum thus prepared modifies the course of the disease, influencing distinctly the character of the eruption, aborting or shortening its course, and in many cases preventing pitting. E. H. Wilson¹⁵⁷_{July, '96} also gives a similar experience with three cases treated in the Kingston Avenue Hospital with serum obtained from a healthy calf recently vaccinated. In these cases improvement set in shortly after the use of the serum, and it was thought that the attack had been distinctly modified by the serum treatment.

W. B. Sampson⁸⁰_{July 15, '95} writes from Transvaal, South Africa, to call attention to the advantages, in zymotic diseases, of a wet pack,—not, however, of water, but of warm milk. Three blankets were laid upon a mattress, and covered by a single sheet saturated with one and a half pints of fresh, warm milk (not boiled). The patient was laid upon the sheet. This was then wound tightly around him, the ends brought over his shoulders, and his arms left bare.

The blankets were then, one by one, packed over him, and he rested thus for an hour. This was done once in four hours. After the pack, a warm bath or sponging. Sampson reports that in eighteen cases so treated by him, in the small-pox lazaretto at Kimberley, before the eruption appeared, the disease was aborted, and the patient convalescent in five days. In one case, where the eruption had just manifested itself, the milk pack was used twice as often. The eruption disappeared entirely within twenty-four hours, and in four days the patient was able to leave his bed.

Niels R. Finsen, of Copenhagen, ²_{Dec.7,'95} submits the following rules for the red-light method in the treatment of small-pox: The exclusion of chemical rays must be absolute; even a brief exposure to daylight may produce suppuration. If glass is employed it must be of a deep-red color, and if curtains are employed they must be very thick or in several layers and nailed fast to insure carrying out the treatment correctly. Faint candle-light may be used during the meals or the visits of the physician. Other treatment which may be considered necessary may be carried out at the same time. This treatment should be commenced as early as possible; the nearer the commencement of suppuration, the smaller the chance of success. The patient must remain in the red light until the vesicles have dried up.

Vaccination.—Marty ²_{Sept.28,'96} states that the time of year has an influence on the success of revaccination. It is generally believed that vaccination direct from the heifer is not influenced by the season, whereas vaccination with vaccine-lymph should be practiced in cold weather. The author has observed that, under these circumstances, vaccination has a slower evolution. The following table gives the exact results:—

Date.	Cases.	Successes.	Per Cent.
January	279	124	44.44
March	848	502	59.19
April	597	184	30.82
May	948	336	35.44
August	707	88	12.44
September	820	74	9.02
October	635	135	21.25
November	2655	1128	42.48
December	1032	355	51.84

The most favorable months for vaccination are November, December, and March.

Rafinesque and Raymond ³¹_{Dec.8,'94}; ⁶_{Dec.15} discuss the *modus operandi* of vaccination. Their contention that their scraping method is superior to the puncture method is amply supported by the following

figures: Children revaccinated by puncture by Chambon, official vaccinator of the Paris hospitals, 332: successful, 28; unsuccessful, 304. Children revaccinated by scraping, 379: successful, 127; unsuccessful, 252. In these latter cases comparative punctures were also made, and these yielded the same percentage of successes (8 per cent.) as did Chambon's. The greater success of the scraping method is due to the larger absorbing surface thus obtained. It is practiced as follows:—

With the cutting edge of the lancet or, better, the vaccinating style, charged with lymph, the skin is scraped until the superficial epidermic cells are removed and an oozing surface is exposed. This surface, measuring only a few square millimetres, is then covered with vaccinal pulp and the operation is over.

The authors strongly recommend the employment only of this scraping method, more especially in revaccinations. The above figures show that many adults are going about fully believing in their immunity (after unsuccessful revaccination), whereas the operation conducted on the scraping plan would quickly disabuse them of a dangerous error.

Plague.

The epidemic of this disease which visited China called renewed attention to this almost forgotten disease. Netter, ³Feb. 16, '05; ²Mar. 23, '05 after reviewing the history and the geographical distribution of the plague, shows its contagious nature from the following facts: 1. In order to be developed it must be imported. Transmission is either direct, as by means of a plague-stricken person, or indirect through objects sullied by a previous sufferer. 2. The plague attacks especially persons who are exposed to contact with those affected. The epidemic of Wetlianka, in which the medical staff and nurses were nearly all attacked, is a case in point. 3. Isolation preserves from the plague. Rigorous quarantine measures, inflexibly carried out, have always been attended with success. 4. The plague is inoculable. Many observations have shown this. Cerutti, for example, inoculated six Europeans to preserve them from the plague; five of them died. The part played by the air in transmitting the disease is doubtful, but water clearly is antagonistic to it. At Canton nearly 80,000 Chinese dwelling in vessels on the river and in port escaped contagion. The contagion is very resistant, and, under favoring conditions, persistent. Trincavelli relates the death of a servant from handling ropes used in the interment of plague patients twenty years previously. Filth and bad hygienic conditions, though they do not hatch the disease, favor its spread. Extremes

of temperature, especially great heat, retard its virulence. The plague is endemic in Africa and in the part of Asia washed by the Mediterranean and Black Sea; it has never penetrated into Europe except in epidemic form. 5. The microbe was first clearly made out in 1894, during the Hong Kong epidemic, by Yersin and Kitasato. (See "Bacteriology," vol. ii, J-53.)

J. A. Lawson, of Hong Kong, ^{July 27, '96} conducted a series of experiments in the pig, which is but slightly susceptible to the disease. Observations made in six cases show that their temperature is not raised by feeding them on plague-infected spleens. Inoculation in the flank is followed by a rise in temperature of from 2° to 4° F. (1.1° to 2.2° C.) in about twenty-four hours, the site of inoculation becoming œdematous. On careful bacteriological examination of the serum from the œdematous tissue no plague bacilli were found either by the microscope or by cultivation. In their experiments on cattle two animals have been inoculated about six times each, and they showed the same symptoms as the pigs. In these, however, the rise of temperature is somewhat greater; 100° to 101° F. (37.8° to 38.3° C.) is the usual one, but a temperature of 106° F. (41.1° C.) is frequent. They do not lose their appetites at all. An œdematous swelling appears around the place of inoculation; but, just as with the pigs, no bacilli are found in it. The inoculations were made from the bubo direct, from culture, and from rabbits which had previously been inoculated with the disease. The author has not had an opportunity to test the value of the serum obtained as an immunizing agent in cattle. He quotes Yersin as stating that in Yunnan he had proved the presence of the same bacillus in cattle-plague and that it was most deadly. Lawson thinks that he must mean the rinderpest, which is very common in Yunnan.

Biéliavski and Riéshetnikoff ^{Aug. 31, '96} publish an account of a disease but little known, which they name "tarabagania tchuma,"—that is, a plague arising in connection with the tarabagania, a rodent animal closely allied to the marmot. The authors collected twenty-six cases occurring in the Akshin province. The cases were distributed among six families and occurred in the years 1888, 1889, 1891, and 1894. In addition, six corpses of Buriats (a Siberian tribe) were found in an earth hut, bearing signs of having died from this disease. That their death was so caused was confirmed by the fact that a medical man and a feldscher, who made necropsies on these bodies, both contracted the disease and died from it. No case has yet been known to recover from what appears to be one of the most malignant forms of disease yet observed.

The symptoms are the following: The patient sickens with a feeling of heat and general feverishness; the temperature rises; giddiness, intense headache, flushing, restlessness, and distress follow; the pulse becomes rapid and weak. Some patients complain of oppression and pain in the chest, accompanied by occasional dry cough and scanty expectoration, which is sometimes tinged with blood. There is nausea, sometimes vomiting, and toward the end, which generally occurs on the second or third day, there may be diarrhœa. Weakness and general depression are marked features; consciousness remains more or less complete until death. The axillary glands may be swollen and red, but nothing is said as to the occurrence of suppuration. The incubation period seems to be from three to five days or more. No case of recovery has yet been met with; death always occurred on the second or third day. This disease is regarded by the authors as a typical contagious disease. It can be contracted solely by coming into contact with the fluids escaping from the body of an animal who has died from it, or by using the flesh of such an animal in an insufficiently cooked state. In the same way it is transmitted from patient to patient by contact with the fluid excreta or with the liquids which escape from the body after death.

Heat-stroke.

From experiments on dogs, Laveran ¹⁰_{Nov. 27, '94} advances the theory that exercise strongly favors the production of heat-stroke. It causes in itself an elevation of the body-temperature, which is added to the external heat. The author believes that the excessive temperature acts directly on the nervous system, and not by inducing auto-intoxication or coagulation of muscle-fibre. Vallin, however, ¹⁴_{Dec. 19, '94} has obtained quite different results, but under different conditions; for, while Laveran submitted his dogs to excessive physical exercise in a closed room at 60° C. (140° F.), Vallin kept his in the sunlight in periods of great heat, allowing them to die in a state of immobility. Hence, while Laveran never observed at death any rigidity of the heart or coagulation of the muscular fibres, Vallin's animals showed this condition.

Treatment.—The *Therapeutic Gazette*, in a review of the treatment of heat-stroke, says that the only method by which the excessive fever of sunstroke can be controlled is the use of the cold bath in its most active form, since the disordered heat-mechanism of the body necessitates anything but temporizing measures. The same active friction of the skin is necessary during the cold bath for thermic fever as is employed in the Brand treatment of typhoid fever for the purpose of bringing the hot blood from the

centre of the body to the periphery, and it is of the utmost importance that, while the patient is being immersed or sponged with ice-water, a still colder application be applied to the entire head, in order to prevent fatal cerebral congestion.

An equally important therapeutic measure as cold sponging is venesection, which should be free and copious, and is particularly indicated in those cases in which there is much cyanosis or convulsions. Convulsions are, perhaps, a more frequent complication of sunstroke than is generally imagined. The author quotes the statistics of Withington,⁹⁹ May 23, '96 who, out of 100 cases of sunstroke, records 30 as having convulsions. Of the 28 fatal cases in 100 recorded by him, 13 had convulsions, which were sometimes local or general and characterized frequently by marked opisthotonos.

A third point of very great importance is the recollection that secondary and tertiary rises of temperature frequently occur. Not only does the fever often return at once, so that, using a term frequently applied to hæmorrhage, it is "consecutive," but often, after the temperature has been normal for some hours, it will suddenly shoot up and remain persistently high, forming what might be called a secondary fever. In the event of severe headache during convalescence from sunstroke, venesection is of the greatest value for the purpose of overcoming the low-grade meningitis which may exist, and care should be taken that no drug which tends to produce cerebral congestion should be given, such as quinine, for the relief of fever or for its tonic influence.

[In extreme cases the use of two quarts (litres) of cold water by enteroclysis would seem to be indicated, and this procedure may be repeated as often as required.—J. D.]

E. C. M. Page, of New York,⁷⁸⁶ June, '96 states that during the period of convalescence, if the pulse be bounding, veratrum viride and bromide of sodium are useful, and, if the pulse be weak, that ergot should be given. He also suggests counter-irritation to the nape of the neck where evidences of meningeal irritability exist.

Comparatively rarely in sunstroke two conditions arise which may render the diagnosis difficult,—namely, that state in which the surface of the body becomes very cold, when, in reality, the central organs are precisely the contrary, as is shown by the temperature taken high up in the rectum. Under these circumstances the physician must relieve the central temperature by high injections of cold water into the colon, thereby reducing the heat and driving the excess of blood to the surface of the body. The second is heat exhaustion, in which there is an unusual fall in bodily temperature to below the normal in place of the ordinary

rise. In such a case hot injections or baths may be required. They may also be needed when, through inadvertence or accident, cold bathing has been pushed so far in thermic fever as to cause collapse. In cases where such collapse occurs, Vantalon¹⁹⁵_{May, '95} prefers to give at first injections of ether and then injections of caffeine.

INFECTIOUS DISEASES OF CHILDREN.

BY THE CENTRAL EDITORIAL STAFF.

SUBMITTED FOR COMMENTATION TO

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Diphtheria.

Etiology and Pathology.—William T. Councilman, of Boston, states ⁹⁹_{Sept. 5, '95} that, from the anatomical and experimental study of diphtheria, we may regard as certainly established that there is a definite infectious contagious disease produced by the diphtheria bacilli, but that other organisms may produce lesions in the throat which are similar to the primary lesions of diphtheria.

The primary lesions of the disease are due to the action of the diphtheria bacilli. They are always found associated with these lesions, and are chiefly found on the surface or in the upper layers of the membrane. There may be a more or less general invasion of the tissues by the bacilli. They are found in the internal organs in small numbers, and do not appear to have any relation to the lesions. Lesions are produced in the internal organs by the action of soluble toxic substances which are produced by the bacilli in the primary lesions and absorbed. Similar lesions can be produced in animals experimentally by the injection of the germ-free filtrates of cultures.

Cultures made at the autopsies have shown that in most of the fatal cases there is a general invasion of the tissues by some of the pyogenic organisms, of which the streptococcus is the most common. Infection with other organisms plays a considerable rôle in the pathology of the disease, and some of the most important lesions, as the broncho-pneumonia, are due to these other organisms. There is not the same tendency to renal affections in diphtheria as in scarlet fever and other infectious diseases of children. Abrasions of the skin in patients with diphtheria are apt to become infected with the bacilli.

Frederick G. Novy, of Ann Arbor, Mich., ⁹_{July 18, '95} states that the Loeffler bacillus is present in much more than 73 per cent. of real
(H-1)

clinical diphtherias. Pure cultures introduced into animals reproduce false membranes, paralyses, and other ill effects observed in diphtheria; while the chemical products of the bacillus produce paralyses, diarrhoea, intoxication, and death, completing the resemblance to the natural disease. The mortality is vastly greater in those cases in which the Lœffler bacillus is present than in those from which it is absent.

Shuttleworth, of Toronto, ⁶_{Sept. 14, '96} presents a table of cases classified as mild, severe, very severe, and fatal, and the proportion with reference to each organism or combination is given in round percentages:—

ORGANISM.	Mild.	Severe.	Very. Severe.	Fatal.
Bacillus diphtheriæ	46.6	11.2	22.5	19.3
Bacillus diphtheriæ with streptococci	32.1	17.8	21.4	28.5
Bacillus diphtheriæ with staphylococci	27.2	18.1	22.7	31.8
Bacillus diphtheriæ with streptococci and staphylococci	54.3	11.4	20.0	14.2
Staphylococci only	97.3	2.7		
Streptococci only	100.0			
Staphylococci and streptococci	100.0			

The general belief that the most fatal cases result from the association of Lœffler's bacillus with staphylococci or with streptococci is confirmed by the above figures, and the former combination is the most serious. It is, however, extraordinary that, when both cocci are present with the Lœffler bacillus, the death-rate is apparently reduced by one-half. This would indicate an antagonism between the combined cocci and the bacilli,—a supposition which he does not care to urge until further evidence is obtained.

It is often supposed that diphtheria, with a severe local lesion and severe general symptoms, is due to a mixed infection by diphtheria bacilli and by streptococci. Generisch, ⁵_{Apr., '96} who examined the blood and internal organs, soon after death, in twenty-five cases of this kind, found that there is not necessarily a mixed infection. In cases with the most pronounced septic symptoms streptococci may be absent from internal organs, while, on the other hand, these organisms may be found in cases free throughout from septic symptoms. The author, therefore, thinks that diphtheria bacilli are able in themselves to produce septic symptoms.

Reiche, in a similar research, found both streptococci and staphylococci in 64 per cent. of forty-two fatal cases; streptococci only, in 45 per cent.; diphtheria bacilli, twice. Secondary infection by streptococci was found in a case that proved fatal on the second day of illness. In two other cases secondary infection was present on the third and the fourth day.

Shuttleworth⁶_{Sept.14,'96} has found the following organisms present in thirty-two fatal cases:—

	Per Cent.
Löffler's bacillus only,	37.5
Löffler's bacillus with streptococci,	25.0
Löffler's bacillus with staphylococci,	18.7
Löffler's bacillus with streptococci and staphylococci,	18.7

The staphylococci were in all cases staphylococci pyogenes aurei. No fatal results took place when only cocci were present.

Kutscher⁵⁸_{B.18,H.1; Dec.1,'94} made a study of the tissues from ten fatal cases of diphtheria, and found diphtheria bacilli in the foci of broncho-pneumonia. The organisms were most abundant in the alveoli containing large numbers of cells, and were usually inclosed in the cells. Frequently streptococci were also found. The diphtheria bacilli were also found in the perivascular lymph-spaces, and in smaller number in the bronchi. The organisms were found in the lungs in eight cases, in one instance in the kidneys, and in one instance in the liver.

Wright⁹⁹_{v.131,No.14,p.329,'94} concludes that there is practically no difference in virulence to be observed between the bacilli derived from severe and mild cases of diphtheria. Cases in which true diphtheria bacilli have been present for a longer or shorter period of time furnish fewer virulent cultures than cases of recent beginning. The diphtheria bacillus does not, as a rule, lose its virulence by long-continued residence in the pharynx and air-passages. It exists in all degrees of virulence down to innocuousness, as far as is shown by the results of its inoculation into guinea-pigs, and the intensity of the reaction in the animal bears no constant relation to the symptoms presented by the case from which it was derived. There is no relation to be observed between the age or sex of the patient and the virulence of the bacillus.

During a diphtheria epidemic which occurred among soldiers in a barrack, Aaser, of Christiania,⁶⁹_{No.22,'96}¹¹_{Oct.} found virulent diphtheria bacilli in 17 cases—i.e., 19 per cent.—in the mouths of 89 healthy subjects. In a scarlatina ward of his hospital, infected by one case of diphtheria, he found bacilli in 20 per cent. of the children with scarlet fever without diphtheritic affection. After removal of the infected soldiers from the barrack and the children from the ward the epidemic ceased.

Le Gendre and Pochon⁴²⁰_{Dec.13,'95}⁶_{Dec.21} had under observation for fifteen months a child who, in less than three years, had had three attacks of diphtheria (once faucial, once buccal and nasal combined, and once nasal and faucial combined). Since the methodical bacteriological examination of the nasal and pharyngeal mucus has been undertaken (thirteen times since September,

1894), Loeffler's bacillus has been invariably discovered, either retaining its virulent properties or deprived of them (not killing the guinea-pig), and either appearing in the form of average bacilli or being dwarfed, or again assuming the shape of the "coccus Brissou." Sometimes the bacillus was present alone and sometimes associated with the staphylococcus. Copious nasal and pharyngeal douches with a 5-per-cent. solution of Labarraque's liquor caused the temporary disappearance, total or partial, of the bacillus. But a suspension of the treatment for some time is followed by a change in the child, who loses his gayety, appetite, and color; an examination then reveals the presence of the micro-organism. It is evident that it continues to lurk in the recesses of the nasal and pharyngeal cavities. This example of latent microbism is worthy of record.

Shuttleworth, of Toronto, ⁶_{Sept. 14, '95} has made some observations on the persistence of the bacilli in the throats of infants and has found that the shortest period for the disappearance of the bacilli after the patient's admission to hospital was five days and the longest forty-two days. A somewhat interesting case was that of an adult, in which by the thirteenth day the bacilli had entirely disappeared and recovery was progressing rapidly. On the thirteenth day after this, and within one day of the termination of the stipulated period of convalescence, re-infection occurred, as evidenced by the clinical signs of the disease and confirmed by the bacteriological test. By the thirteenth day the bacilli had again disappeared, and the discharge of the patient followed shortly afterward. This was a clear case of re-infection, and, taken in connection with the ascertained variability in the persistence of the bacilli, shows conclusively that a definite time-limit cannot be placed to the period of convalescence, and that though a detention of fourteen days after the disappearance of the exudate is a fairly well chosen term it is sometimes too long for the safety of the patient and often not long enough to prevent infection being carried by those who are discharged. Park and Beebe think that the isolation of patients should continue until cultures prove the absence of bacilli, and when such examinations cannot be made at least three weeks should elapse after the disappearance of the membrane.

From a study of 90 cases of adult diphtheria (60 women and 30 men) Gouguenheim ³⁷_{July, '95} concludes that the disease is much more important in the adult than has hitherto been supposed. It may present itself in the form of ordinary diphtheritic sore throat, involving most of the surface of the throat, though this may not be the most frequent aspect. A great many cases occur as fol-

licular or acute lacunar tonsillitis; these are usually very benign and recovery takes place spontaneously, as a rule. Herpetic angina may sometimes be one of the forms. Benign diphtheritic angina may sometimes be complicated with suppuration. Adenopathy is frequent, but not present in all cases.

Dieulafoy ¹¹⁵³ July 6, '95; ¹ Aug. 3, '95 related the histories of five cases, the first of which came under the observation of Kelsch, who found the diphtheria bacillus in a case of pharyngitis presenting all the characteristics of a common herpetic sore throat. The second case was one of Huchard's; it broke out very suddenly with intense symptoms, and was accompanied by herpes of the pharynx and of the lips. Huchard made a diagnosis of herpetic angina, which was confirmed by Brocq. At the end of a few days the child died from the disease, which proved to be malignant diphtheria.

Diagnosis and Prognosis.—Deucher ²¹⁴ Aug. 15, '95; ⁹⁰ Oct., '95 records the results of the bacteriological examination for Loeffler bacilli in one hundred and forty-six cases, admitted into Sahli's clinic with the diagnosis of diphtheria, croup, or angina. Tubes of glycerin-agar (7 per cent. glycerin) were inoculated with pieces of membrane, or with mucus, from the tonsils or from the trachea; also cover-glass preparations were made. The glycerin-agar cultures were kept in a hot chamber at a temperature of 38° C.; when the inoculation gave positive results, in twelve to twenty-four hours, typical small round cultures were seen, at first transparent, soon white in the centre, then brownish yellow. When the cultures were not pure the diphtheria bacilli and other organisms were separated by further culture. Dry cover-glass preparations were stained with Loeffler's methyl-blue, and according to Gram's method. In the latter examinations borax methyl-blue was used in place of Loeffler's blue. (Distilled water, 40; saturated watery solution of methyl-blue, 24; borax, 5-per-cent. solution, 16. Mix and allow to stand one day, then filter.) Inoculation experiments on animals were also performed. The tabulated results of the bacteriological examinations will be found on next page.

The author draws attention to the following points of diagnostic importance with respect to the various forms of sore throat: 1. The clinical diphtheria of the pharynx with typical pseudo-membranes is, if scarlatinous diphtheria be excluded, in most cases similar to Loeffler's diphtheria. 2. The punctiform diphtheria also is, in most cases, combined with Loeffler's bacilli, and also differs clinically from angina lacunaris. 3. The typical angina lacunaris differs from punctiform diphtheria. The secretion contains no Loeffler bacilli. 4. The pseudodiphtheria caused by streptococci

A. FAUCES.		
	No. of Cases Examined.	Löffler's Diph- theria Bacilli Found in
I. Diphtheria with typical membrane,	75	75
II. Angina without typical diphtheritic mem- brane:		
1. Punctiform diphtheria of the tonsils:		
(a) Without laryngeal obstruction,	4	4
(b) With " " "	11	11
2. Angina lacunaris (follicular tonsillitis),	6	0
3. So-called streptococcic diphtheria, .	1	0
4. Angina catarrhalis:		
(a) Without laryngeal obstruction,	5	3
(b) With " " "	26	16
5. Angina necrotica, etc.,	3	1
III. Normal tonsils,	15	8
B. LARYNX AND TRACHEA.		
I. Croup with distinct membrane,	77	76
II. Croup without distinct membrane, including pseudocroup,	27	7

is not only bacteriologically, but also clinically, different from Löffler's diphtheria, and can easily be differentiated from it after exclusion of scarlatinous diphtheria. 5. In common catarrhal angina, and also in the normal mouth, diphtheria bacilli are sometimes found. 6. True pseudomembranes in the air-passages and larynx nearly always show the presence of Löffler's bacilli. 7. In cases of true laryngeal croup Löffler's bacilli are often found in the tonsils. 8. If neither in the larynx nor in the pharynx can pseudomembranes be found, the pseudocroup can be differentiated by anamnesis and the symptoms of membranous croup. 9. In pseudocroup, clinically diagnosed, in most cases no Löffler bacilli are found. 10. Diphtheria and membranous croup are not so frequently diagnosed as they should be. 11. The complication of diphtheria with streptococci does not give such bad results as is often believed. 12. True diphtheria can never be excluded from negative results of bacteriological examination. 13. In two-thirds of all cases in which Löffler's bacilli are present they can be found in the dry preparation.

E. Klein, ²²_{Oct. 16, '06} in an article on the diagnostic value of the diphtheria bacillus, states that the bacilli found in the false membrane of typical cases of diphtheria, as a rule, occur abundantly in the membrane, in some cases in almost pure culture. As regards the size (or length) of the bacilli, both in preparations of the membrane and in those of the resulting colonies in culture, there appear certain differences; for in some cases the bacilli are very short, in others there are a good many long forms isolated or arranged more particularly in chains, with segregated protoplasm and with

larger or smaller club-like enlargements. From his experience he is not able to confirm the observations of those who recognize a definite relation existing between the size (length) of the bacilli and the severity of the case from which they are derived. He has seen cases which ran a rapidly fatal course, and, on examination of the membrane taken from the fauces in faucial diphtheria or from the larynx in diphtheritic croup, it (the membrane) contained, in almost pure culture, sometimes very short, sometimes long, forms of the bacilli, and the same applies to the cultures made from the membrane. On the other hand, he has examined membranes removed from the fauces of cases of diphtheria which were mild and rapidly recovered, and which yielded an abundance of diphtheria bacilli of the short variety, while others yielded those of the long variety.

A second group comprises cases, which in clinical and epidemiological respects are undoubted diphtheria, which can be traced to an antecedent case of diphtheria, and in which the membrane or muco-purulent secretions contain a very variable number of the diphtheria bacilli; but they contain at the same time a very large number of other microbes, which on cultivation prove to be chiefly cocci, staphylococcus aureus and albus, small streptococci, and chains of larger cocci. In these cases the number of diphtheria bacilli may be sufficiently large to be identified by their shape and grouping, and to be easily recognized by culture, or they may be so limited as to be only identified by culture; but even then the chances of identification are not great if the bacilli are practically swamped by cocci, notably streptococci. Under such circumstances, only after careful and extensive searching can the colonies of diphtheria bacilli be discovered.

The third group of cases includes those in which no obvious antecedent connection can be established, and in which the clinical history does not enable one to make a diagnosis. It is obvious that it is precisely in these cases that correct diagnosis is of the utmost importance. Now, if from the secretion of the fauces (in cases of faucial inflammation, follicular tonsillitis) or from the nose (in cases of rhinitis) diphtheria bacilli can be isolated, then the case must be pronounced to be one of diphtheria.

Most of the difficulties in diagnosis by culture are overcome by surface agar plates, for in these almost every colony can be subjected to microscopical examination. Any one with a little experience can recognize, when examining the agar surface with a magnifying power of 100 to 150, whether a colony is composed of diphtheria bacilli, and, if so, can, under a simple microscope, make subcultures from such a colony.

Lastly, there are cases of sore throat and membranous exudations in which, even on most careful search, no diphtheria bacilli can be recognized by culture. The microbes, though sometimes comparatively limited in number, consist chiefly of cocci, and cultivations do not yield diphtheria bacilli. The cocci chiefly present in these cases are staphylococcus aureus and albus, and particularly streptococci. Such cases are recognized now as cases of pseudodiphtheria, or coccodiphtheria, though in clinical respects they are not distinguishable from mild cases of diphtheria. As regards their sequelæ, they are not difficult to distinguish from true membranous diphtheria, and, as stated before, they do not present the true diphtheria bacilli.

On the whole, then, the microscopical examination and culture-test alone will be found to supply a valuable help in diagnosis, and, where necessary, it may be effectually controlled by animal experiments.

According to the age and origin of the culture, the result is found different as regards the severity and duration of the disease in the guinea-pig.

His experience, which is in harmony with that of other observers, goes to show that there is no definite relation between the virulence of the culture, judging by the quantity required for producing a result in the guinea-pig, and the severity of the case from which the culture is derived. The author refers to the important discoveries by Sidney Martin as to the chemical identity of the toxins of diphtheria, both of culture and of the human body infected with diphtheria, so as to identify the physiological action of these toxins,—that is, their capability of producing paralysis. We are justified in concluding that, morphologically, culturally, experimentally, and in chemical respects, sufficient data exist which enable us to say that the Klebs-Löffler bacillus is the true cause of diphtheria, and to give in most cases a definite, positive or negative opinion, according to the presence or absence from the exudations of the diphtheria bacilli. Consequently, if in cases, which, in clinical, pathological, and epidemiological respects, are of doubtful nature, the presence of true diphtheria bacilli is demonstrated, we are justified in declaring that they are cases of true diphtheria.

At the same meeting J. Eyre read a paper on Neisser's xerosis bacillus, commenting on its close resemblance to the bacillus diphtheriæ. He had isolated it from the conjunctival secretion of a series of cases which presented slightly different appearances from the ordinary form of follicular conjunctivitis, and which appeared to be somewhat infectious. Also from one case of trachoma; but

had been unable to detect it in the secretion from normal conjunctivæ. The cultural and morphological appearances upon various media were described and the difference between it and the Klebs-Löffler bacillus pointed out. The chief points to be relied upon in differentiating the xerosis bacillus from the bacillus diphtheriæ were summed up as follows: 1. First cultures from the conjunctival secretion, etc., do not make their appearance under thirty-six to forty-eight hours. 2. The production of an alkaline (never an acid) reaction when grown in broth or milk. 3. Retarded and scanty growth on gelatin, poor growth and rapid death upon potato. 4. The invariably innocuous character of both cultures when inoculated into animals susceptible to the bacillus diphtheriæ. 5. The transition to a short, straight bacillus staining evenly, after cultivation upon blood-serum for ten to fifteen generations, and the restoration of those characters which render it liable to be mistaken for the diphtheria bacillus when transplanted on to glycerin blood-serum.

Landouzy ¹¹⁵³_{Aug. 3, '96} insists on the necessity for examining all sore throats bacteriologically, for clinically it is almost impossible to diagnose many throat affections from diphtheria. To illustrate this point he gives the results of 860 cases examined bacteriologically. In 364—that is, in 42.3 per cent.—Löffler's bacillus was found, and of these 269 showed pure cultivations of Löffler's bacillus, 25 contained an admixture of streptococci, 70 contained an admixture of staphylococci and other cocci. Of the cases in which Löffler's bacillus was not found a few showed pure cultivations of the streptococcus, but the majority showed a mixture of various micro-organisms. A further difficulty in the clinical diagnosis occurs where faucial syphilis simulates diphtheria, and the difficulty is increased when it is suggested that, probably, the two conditions may be combined. It is in such cases that the value of bacteriological investigation is seen.

Dieulafoy ³_{June 12, '96} observed a series of cases, with herpetic pharyngitis and herpes, which were shown by the supervening paralysis to have been diphtheria. Cadet de Gassicourt and Robin ¹¹³⁹_{No. 27, '95} have observed similar cases. D'Astros ⁴⁶_{May 15, '95} among 322 cases, found the bacillus but 194 times.

According to Nolen ⁶⁹_{No. 23, '96} a negative result of the bacteriological examination should not mislead the diagnosis, since diphtheria is often present where no bacilli are to be found. He warns against the overestimation of the bacteriological examination.

According to McCollom ⁹⁹_{May 9, '96} the fact of not finding the diphtheria bacillus in cases of clinical diphtheria seems to him to

be always due to some error in technique in making the cultures. It sometimes happens that, when there is a membrane, the first culture may be negative, but the second culture almost invariably will be found to contain the characteristic bacilli. In connection with this there is one important practical point which does not seem to be fully appreciated by the profession. This point is the fact that, on the surface of the membrane, the bacilli frequently die, and, therefore, if the culture be taken directly from the surface of the membrane in the majority of cases a negative result will be obtained. If, however, on the other hand, the wire be passed through the membrane or along its edges a positive result is almost invariably reached. It is also advisable to take a second culture from the secretions of the mouth without reference to the site of the membrane. The advantage of this mode of procedure has been satisfactorily proved in a great number of cases examined the past year.

Thomas Cherry, of Melbourne, ²⁸⁵_{Apr. 20, '95} on the contrary, in summarizing the results of the latest investigations, calls attention to the fact that the diphtheria bacilli are found most abundantly in the superficial layers of the exudation, and not, as was formerly taught, in the deeper tissues. They are separated from the epithelium of the mucous membrane by a layer of fibrin and small round cells, and in malignant cases they may form almost a pure culture in this situation.

Shuttleworth, of Toronto, Can., ⁶_{Sept. 14, '95} states that the question is often asked whether, by a microscopical examination of a smear of the exudate, it is possible to make a diagnosis. In many cases a reliable conclusion can thus be formed, but in others it is quite impossible. Failure may arise from the fact that the bacilli are few, while other organisms are very numerous, and the characters of the Loeffler bacillus are in the natural medium often very difficult of recognition. On looking over the records of the last 100 exudates examined, he finds that the bacillus was noted as being undoubtedly present 36 times, and as being probably present 39 times. In the other cases the organism was either not present or not recognizable. According to this, it is possible to make from the exudate a sure diagnosis in at least one-third of the cases, and to form a fairly correct idea as to the nature of about three-fourths. Negative results have not any diagnostic value, as failure to detect the bacilli does not necessarily prove their absence.

Nauwelaers, of Brussels, ⁸⁶⁸_{June 8, '95} uses horse-serum gelatin for a culture-medium for the diphtheria bacillus, believing it to be quite equal to the glycerin-agar. The authors state that the colonies are not always recognizable in twenty-four hours, as has been

stated, and there are colonies of cocci of twenty-four hours which exactly resemble diphtheria bacilli of the same age. When the former are numerous and the latter rare, the four or five colonies examined under the microscope may all be cocci. This proved to be the case in several instances, in the author's experience, even when several series of tubes were inoculated. Examination twenty-four hours later showed colonies of diphtheria bacilli easily visible by the naked eye. He asks whether it was not through neglect to leave the cultures a sufficiently long time before examining that certain bacteriologists declare that sometimes subcutaneous inoculation of false membrane into guinea-pigs gives rise to abundant development of diphtheria bacilli, while inoculation into serum gives negative results. He inoculated under the skin of a number of guinea-pigs false membrane from two cases of angina having every appearance of diphtheria, and one case of angina complicated with croup. Cultures had not shown the diphtheritic nature of these cases. Subcutaneous inoculation also failed to show, the bacillus not being found at the site of inoculation, nor by microscopical examination, nor cultures, and the animals continued to live.

Ohlmacher⁹_{May 4, '96} suggests that, inasmuch as a prompt bacteriological diagnosis of diphtheria is of immense importance in cases in which the antitoxin treatment is to be early applied, the old plan of inoculating blood-serum with a swab, and then waiting twelve hours for visible colonies to appear, be abandoned, and the surface of the culture-medium examined five hours after being stood in the incubator. To do this a platinum-wire loop is carefully rubbed over the surface, and the material secured, then mixed up with a drop of distilled water upon a cover-glass, dried, stained with methylene-violet, and examined microscopically. By this means six or seven hours' time can be saved. Ohlmacher also mentions the drawback which expensive apparatus in the form of an incubator is to many who would otherwise make careful examination of their cases, and has experimentally found that eighteen hours at the room-temperature will answer as well as the five in the incubator.

Crouch¹_{Oct. 5, '96} recommends as probably the safest method of direct cover-glass examination to stain with dahlia-methyl green and then with a dilute aqueous solution of Bismarck brown, leaving the latter to act until the bacilli are stained either faintly reddish (from the dahlia remaining in them) or faintly brown. A good lens and a trained eye will be required, however.

According to Bernhard the sediment of the urine affords a means of prognosis. In severe cases there is an early appearance

of figured elements (altered epithelium of the kidney, short hyaline and granular casts, drops of fat, leucocytes, rarely red blood-corpuscles, and in opposition at times abundant uric acid and uric-acid salts). Albuminuria is frequently present. But little sediment means a light case, especially when the epithelium shows but small pathological lesions. Examination of the urine in cases where there are but few local symptoms serves not only for a passably certain prognosis, but also for diagnosis; in non-diphtheritic angina the characteristic sediment is wanting. If it appear from the very beginning, it announces that the kidneys have been much affected, and promises a very pernicious or lasting attack of diphtheria.

Treatment.—The leading paper of the year is incontestably that of Wm. H. Welch, of Baltimore, ⁷⁶¹July, Aug., '96 in which the antitoxic-serum treatment is reviewed in a most comprehensive and thorough manner. After a brief historical introduction the author states that, unless one denies absolutely the causal relation of the Lœffler bacillus to diphtheria, it must be admitted that the treatment rests upon a sound experimental basis. The laboratory does not furnish any more impressive experiments than those which demonstrate the power of antitoxic serum to prevent and to cure the disease caused in animals by inoculation with the diphtheria bacillus or its poison. The serum arrests the spread of the local process and abates the symptoms of general toxæmia. These experiments have further shown, beyond a doubt, that the serum possesses properties which are directly and powerfully antagonistic to the toxic action of the diphtheria bacillus, and there is no reason whatever to doubt that, under similar circumstances, this antagonistic power, so readily, surely, and uniformly demonstrable in the case of lower animals, will also manifest itself in man.

We have no positive knowledge as to the nature of the substances called antitoxins, nor as to their mode of action; we have no positive knowledge as to the mode of action of many of our therapeutic agents. There are two prominent theories as to the mode of action of the diphtheria antitoxin; the one may be called *chemical* and the other *vital*. According to the chemical theory, the antitoxin directly neutralizes the toxins chemically. This seemed to be the natural interpretation of the fact that the injection into susceptible animals of a mixture in suitable proportions of the antitoxin and the toxin is harmless. This view was shown by Buchner and Roux to be incorrect, however, and the chemical theory had to give way to the vital theory,—*i.e.*, that in virtue of which the toxin acts through the agency of the living body, and probably in the sense that it renders the cell tolerant of the toxin. Practical

evidence sustains this argument. If the curative effects of antitoxic serum are brought about through the agency of the living cells of the body, we can readily understand why these effects will not follow the introduction of serum with the certainty and precision of a chemical reaction. The cells must be in a condition to advantageously respond to the effects of the antitoxic serum; if they are weakened by intense or prolonged action of the diphtheria poisons, by other concomitant diseases, by inherent weakness or idiosyncrasy, this responsive power finds itself in abeyance, and no beneficial influence is exerted by the antitoxic serum. It accounts for the fact, also, that antitoxic serum exerts no bactericidal effect upon the diphtheria bacillus proper; the latter may persist in the throat weeks after recovery following injections of the serum.

Of great practical importance is the fact that a definite quantity of antitoxin is required to neutralize a definite quantity of toxin. In animals the curative dose of antitoxin stands in definite quantitative relation to the size and susceptibility of the individual and to the amount and intensity of the poison in the system. The dosage at present, therefore, is empirical,—the age of the patient, the assumed duration of the disease being our only guide; hence we are not aware of the effect produced; we do not know whether a quantity of antitoxin utilized is adequate to neutralize the effects of the toxin present. In the earlier period following the introduction of the treatment it is now known that insufficient doses were administered.

Clinical experience and experiments in animals have demonstrated that, the earlier the antitoxic serum is administered after the inception of the disease, the better are the chances of recovery. Guinea-pigs are seldom saved if forty-eight hours have elapsed between the primary inoculation and the administration of the antitoxin. In human beings, however, the evidence is conclusive that the superiority of serum treatment over all other methods is most strikingly manifested in cases in which the serum is not given later than the third day of the disease. The importance of beginning the treatment at the earliest possible moment, without waiting to determine by cultures whether or not the Loeffler bacillus is present, cannot, according to the author, be too strongly emphasized.

The fact that the benefits of antitoxin decrease as the duration of the disease and its inherent complications increase renders difficult the collection and analysis of absolutely convincing statistics. The accusation can be brought that many of the cases which have promptly responded to timely treatment were mild.

This objection can be fully met only by large statistics collected from many epidemics at different times and in various localities. The statement frequently made that a large percentage of the cases of diphtheria are not true diphtheria is quite misleading. When the fact is borne in mind that repeated painstaking examinations (microscopical and cultural) by a skilled bacteriologist are required for the detection of the bacillus, the likelihood of a negative result in less able hands may readily be understood.

Militating against the efficiency of the treatment is the fact that in many cases these are mixed infections, the micro-organisms of which are not influenced by antitoxin, and most common and dangerous of which is the streptococcus pyogenes. Without doubt the remedial rôle of antitoxin is materially restricted by its inability to combat developed streptococcic sepsis, broncho-pneumonia, and other complications referable to secondary infection; but the timely administration of the antitoxic serum, by antagonizing the effects of the Loeffler bacillus, antagonizes, in large part, the causes of the increased susceptibility to secondary infections, and thus greatly lessens the frequency of their occurrence. Obviously antitoxin cannot restore cells already seriously damaged by the diphtheria bacillus or its toxins, which are potent poisoners of cells, the internal lesions of pure diphtheria being especially characterized by widely-distributed areas of cell-death. Paralysis—even cardiac paralysis following the administration of antitoxin—cannot therefore necessarily be ascribed to failure of this agent.

The published testimony of those who have had the largest opportunity to study the therapeutic effects of antitoxin is overwhelmingly in its favor. Recovery following its use is such a natural kind of a recovery that the impression conveyed is that the same result might have shown itself without the use of the remedy. Very few writers on the basis of personal experience—and this by no means a large one—have expressed an opinion unfavorable to antitoxin.

Welch collected eighty-two reports from different sources aggregating a total of 7166 cases. While the average mortality of diphtheria before the antitoxin treatment was introduced was 43.5 per cent., the 7166 cases treated with antitoxic serum showed a mortality of only 17.3 per cent. As to the relative value of antitoxic serum in operated and unoperated cases, Welch found that the mortality after tracheotomy had been reduced from 64.5 per cent. to 42.5 per cent., and that after intubation from 62.4 per cent. to 31.6 per cent. The fatality in 3127 unoperated cases was only 11.4 per cent., against a previous mortality of 26 per cent. Furthermore, many cases of laryngeal stenosis had been relieved by

antitoxin in which operation would have otherwise been performed, cases free from laryngeal involvement at the time of injection rarely developing it later. Hence tracheotomy has become rarer since the introduction of antitoxin, and should, in the near future, give place entirely to intubation. In this operation serum-therapy will lead to a reduction of the time during which the tube is to be kept in the air-passage. The curative effects of the new treatment are most strikingly shown in the reduction of mortality among children under 2 years old from over 60 per cent. to 33.3 per cent. Behring claims that if antitoxin treatment is properly begun before the third day of the disease the mortality will fall below 5 per cent., and this is borne out by statistics. Thus, out of 222 cases so treated on the first day of the disease, only 5, or 2.2 per cent., died; while out of 241 first-day cases treated without antitoxin, 44, or 18.3 per cent., succumbed. The percentage of deaths in 814 cases to which antitoxin was administered on the first or second day was only 5.5; the mortality in cases untreated till the third or fourth day was nearly three times as great (15.2 per cent.). The most striking confirmation of the value of antitoxin was afforded in Baginsky's clinic, where the supply ran short during an epidemic. The interruption of the serum treatment promptly raised the mortality from 15.6 to 48.4 per cent.

[Welch's statistics included cases published up to about the middle of the year 1895, and aggregated, as stated, 7166 cases. The literature in the editorial rooms of the ANNUAL shows that during the second half of the year 1895 there were recorded 14,808 cases, exclusive, of course, of such statistical reports as Eulenberg's, R. A. Foster's, the *Deutsche med. Wochenschrift's*, Monod's, etc. A careful compilation of the results obtained in these 14,808 cases shows almost the identical proportion given by Welch. The latter's percentage was 17.3 per cent.; the ANNUAL's is 17.15 per cent., all doubtful points being recorded so as to throw the disadvantage on the side of the antitoxin treatment.—ED.]

Of the above statistical reports, the most interesting by far is that of our German contemporary, giving the result of a collective investigation relative to the antitoxin treatment in Germany, and compiled by Berthold.⁶⁹ The patients were treated between the 1st of October, 1894,^{No. 32, p. 509} and the 1st of April, 1895.

1. Treated with injection of serum.

	No.	Deaths.	Per Cent.
Under 2 years,	735	160	21.8
From 2 to 10 years,	4030	355	8.8
Above 10 years,	1068	44	4.1
Total,	5833	559	9.6

(a) Injected the first or second day.

	No.	Deaths.	Per Cent.
Under 2 years,	401	45	11.2
From 2 to 10 years,	2256	90	4.0
Above 10 years,	696	7	1.0
Total,	3353	142	4.2

(b) Injected after the second day.

	No.	Deaths.	Per Cent.
Under 2 years,	334	115	34.4
From 2 to 10 years,	1174	265	22.5
Above 10 years,	372	37	9.9
Total,	2480	417	16.8

(c) Diphtheria without tracheotomy.

	No.	Deaths.	Per Cent.
Under 2 years,	130	38	29.3
From 2 to 10 years,	484	77	15.9
Above 10 years,	87	11	12.7
Total,	701	126	17.9

(d) Diphtheria with tracheotomy.

	No.	Deaths.	Per Cent.
Under 2 years,	49	23	46.9
From 2 to 10 years,	250	75	30.0
Above 10 years,	18	7	38.8
Total,	317	105	33.1

2. Cases treated without serum.

	No.	Deaths.	Per Cent.
Under 2 years,	498	193	39.7
From 2 to 10 years,	2710	411	15.2
Above 10 years,	1271	47	3.7
Total,	4479	656	14.7

3. Total number of cases treated.

	No.	Deaths.	Per Cent.
Under 2 years,	1283	358	27.9
From 2 to 10 years,	6740	766	11.4
Above 10 years,	2339	91	3.9
Total,	10362	1215	11.8

Henri Monod ¹⁴_{Dec. 13, '95} states that the generalized use of antitoxin in France dates from January, 1895, and since that time there is an increasing diminution in the mortality from diphtheria. In 108 towns of France, having a population of more than 20,000, during the first quarter of the seven years prior to 1895,—that is, from 1888 to 1894,—the average number of deaths from diphtheria was 2627. During the first quarter of 1895 the number of deaths was 904,—a decrease of 65.6 per cent. This diminution

not only continues, but it increases, as is proven by the monthly statistics.

Kitasato ²¹⁵⁷/₉₆ collected from reliable sources 26,521 cases of diphtheria in Japan previous to serum-therapy, with 14,996 deaths (56 per cent.); while of 353 cases treated here from November 13, 1894, to November 25, 1895, there were only 31 deaths (8.78 per cent.). There is reason to believe that the mortality can still be lowered if the treatment could be commenced early in the course of the disease. Thus, in 110 cases in which injections were made within forty-eight hours after the invasion all ended in recovery. On the other hand, of 33 cases treated after the eighth day of the disease 11 were lost.

Effects of Antitoxin on Cellular Elements.—J. Ewing ¹/_{Aug. 10, 17, '96} suggests that a more complete knowledge of the leucocytosis of diphtheria may contribute to explain the action of antitoxin and the production of immunity in general, and publishes a valuable paper based upon a study of the blood of fifty-three patients who had undergone the antitoxic-serum treatment. Diphtheria is generally attended by marked leucocytosis, the increase of leucocytes usually beginning a few hours after infection. It probably occurs earlier in refractory cases, and may quite often be delayed in susceptible cases with severe inflammation. In favorable cases the leucocytosis is the greatest at the climax of the disease, and steadily declines during convalescence. There may, however, be prolonged hyperleucocytosis after other local and constitutional symptoms have subsided. In unfavorable cases the leucocytosis continues until death, but in somewhat prolonged cases, with much septic absorption, there may be an uninterrupted decrease of leucocytes, continuing up to the fatal termination. A complicating pneumonia usually causes a considerable increase in leucocytosis. The degree of leucocytosis in diphtheria often varies with the fever, but much more frequently corresponds to the extent of the local lesion. The intra-vascular leucocytosis of diphtheria measures exactly the systemic reaction against the toxic products circulating in the blood and absorbed from the site of infection. High leucocytosis in diphtheria indicates a pronounced reaction against a severe infection, but is not necessarily an unfavorable prognostic sign. Steadily decreasing leucocytosis usually, but not always, accompanies a favorable course in the disease. Slight leucocytosis usually indicates a mild infection, but fatal cases may for several days show no increase, or even a decrease, of leucocytes. The staining reaction of the leucocytes is an accurate measure of the severity of the diphtheritic infection, and variations in this reaction often precede changes in other symptoms.

Antitoxin, within thirty minutes of its injection, causes an hypoleucocytosis, the reduction affecting specially the uninuclear leucocytes, while the proportion of well-stained multinuclear cells is increased. This action is due largely to the immunizing principle contained in the serum. In favorable cases, after the injection of antitoxin, the leucocytosis never again reaches its original height. In severe and less favorable cases the injection is followed in a few hours by hyperleucocytosis and fever, exceeding those symptoms as found in the original condition. In unfavorable cases an injection of antitoxin may be followed immediately by rapid hyperleucocytosis or extreme hypoleucocytosis and death.

The reduction of leucocytes immediately succeeding the injection of antitoxin, especially in severe cases of diphtheria, is an undesirable feature of the action of this agent, and as far as possible should be avoided.

[The writer believes that this reduction of leucocytes may be followed by the formation of capillary emboli throughout the viscera, especially in the lungs and liver, basing this belief on the experiments of Merigo, Goldscheider and Jacob, and his own, in which a moderate reduction of leucocytes in healthy rabbits was often sufficient to produce such lesions.—J. L. S.]

The multinuclear leucocytes found in the blood of favorable cases after treatment by antitoxin show increased affinity for gentian-violet. This change may be observed within twelve hours after the injection, and the failure of its occurrence is a very unfavorable prognostic sign.

The variations in the staining reaction of leucocytes in diphtheria indicate that the nuclei of these cells contain a principle essential to phagocytosis and immunity in this disease.

Louis Waldstein, of New York, ⁴_{No. 17, '96} also observed that before the injection of the serum, and during the entire period of the height of the disease, the multinuclear cells were more or less increased in number, sometimes fivefold, while the lymphocytes were as largely diminished; for example, 20,000 to 400. As soon, however, as improvement began this relation suddenly altered, the multinuclear cells falling to the normal proportion and the uninuclear ones increasing. If the case continued favorable, the relation remained the same with very slight deviations. Cases which did not improve exhibited, after the injection, an increase of the lymphocytes without any diminution in the multinuclear cells. This latter condition was in every case an unfavorable prognostic feature. Either the patient died or the disease took a more or less chronic course with disease of the lymph-glands, with ear-

complications, or with other sequelæ. The contrary relation of the number of leucocytes showed no regular correspondence with the course of the fever or the character of the pulse, and did not appear to have any causal connection with the visible exudates. The only characteristic was the general condition; the children usually lay apathetic, and in many cases had to be nourished artificially.

Effects on Urine.—A. Baginsky^{B.16,p.331}¹⁵⁸ has systematically examined the urine for albumin in 279 cases of diphtheria, making microscopical examinations of the urinary sediment. In all the cases Lœffler's bacillus was detected in the secretions; so that it may be taken for granted that no cases of non-diphtheritic sore throats were included in the list. Of the 279 cases albumin was found in the urine in 131,—that is, in rather less than half of the cases; of these 66 died, or 50 per cent. Of the 148 in which albumin was absent 20 died, or 14 per cent.

Karlinski^{No.8,'95}⁸ injected serum into himself with the following results, as far as urinary disturbances are concerned: Ten cubic centimetres produced no change in the normal constituents; albumin and sugar were not present. In the three tests made, an increase of urea, uric acid, and kreatinin set in on the third day after the injection. This increase, however, remained within normal limits. Karlinski is of the opinion that the albuminuria occasionally seen after use of the serum is due to the disease, and not to the serum. Moizard and Perregaux found albumin in the urine 82 times in 250 cases, but these authors do not attribute its presence to the serum treatment.

Several writers are of the opinion that the albuminuria can be directly caused by the serum, the latter view being founded upon experiments upon animals and clinical researches. Vissmann,⁵⁹^{Sept.4,'95} for instance, observed, in a series of researches upon animals, that the spleen and liver were enlarged and that doses of the strength given to children gave rise to nephritis. Soltmann found²¹⁵⁹^{'95} albumin following the injection in 72 per cent. in cases which previously had none. Adæ¹³³^{No.12,'95} observed in 24 cases out of 25, previously free from albumin, the appearance of the latter in the urine at once after the injection. In order to decide the question, he injected into himself serum No. 1, after having repeatedly taken his temperature and examined his urine and found them normal. After the injection a slight rise in temperature appeared, with sympathetic vomiting, pain in the kidneys, and oliguria; the urine was of high specific gravity, dark-red, cloudy, and contained much albumin. Exudation casts were found with red blood-corpuscles microscopically. The urinary secretion was normal only

four days later, though albumin was still to be found in the urine three weeks after. Schröder³⁴_{Nov. 14, 15, '95} noted albumin in 64.84 per cent. of cases, Fürth³⁴_{No. 30, '95} in 64 per cent., and Bókai⁶⁹_{No. 15, '95} in 42.5 per cent. Violent vesical inflammation was noted by many writers.

Von Kahlden⁸⁵⁴_{Feb. 23, '95} ¹¹²_{June, '95} experimented upon a series of rabbits and guinea-pigs to determine whether the injection of the antitoxic serum in large amounts produced any untoward effects upon the kidneys and heart. The largest amounts used were 16 cubic centimetres (4 fluidrachms) given to a rabbit weighing 1350 grammes (2 $\frac{4}{5}$ pounds), and 12 cubic centimetres (3 fluidrachms) to a guinea-pig. The kidneys were preserved in alcohol and Flemming's solution. The microscopical examination of all the specimens led von Kahlden to conclude that no pathological changes were present and that the serum was absolutely harmless upon the kidneys. When doses of such size produce no alterations one can readily conclude that the ordinary doses, given in proportion to the body-weight and relatively much smaller, are without effect upon these organs. Von Kahlden points out that the kidneys of men may behave differently from those of animals, but calls attention to the fact that this difference cannot be very great, as the action of the diphtheria toxin is the same upon both. He examined several kidneys from cases treated with the antitoxin, but found nothing to suggest that they had been damaged by the treatment. Inasmuch as cardiac paralysis had been several times mentioned as following the use of antitoxin, Von Kahlden carefully examined the hearts of the animals experimented upon without finding the slightest pathological change.

Suppression of the urinary secretion was noted by Guinon and Roufilange.⁴⁵¹_{May, '95} These authors report a death from uræmia after using serum. Increase of urates, the urine containing over 50 grammes of urea to the litre and from 2 to 5.5 grammes of phosphoric acid to the litre, is reported by Variot and Cochinal.⁹⁹⁶_{June 25, '95} Mongour, of Bordeaux,¹⁸⁸_{May 12, '95} finds from his researches that hyperazoturia is constant after the injections, the amount of urea exceeding the normal and appearing to be the greater in proportion as the recovery is rapid. This cannot be attributed to any thermic or alimentary modification, and must be due to the serum. It is increased only during the twenty-four hours following the injection, falling afterward until it reaches the normal. The inversion of the formula of phosphates and chlorides appears to be a consequence of the diphtheritic infection. The injections rapidly destroy this inversion and bring the figure of chlorides and phosphates to the normal.

Effects on Temperature.—The influence of the serum upon the temperature is given differently by different authors. Monti says⁸_{No.4,'95} that with a sufficient number of doses the temperature is brought down permanently to the normal; yet at times, notwithstanding favorable changes in the local affection, a remittent fever lasting many days appears, from which the patients recover but slowly. Heim⁸_{No.40,'95} observed a constant fall of the temperature and pulse-rate.

In opposition to the above, Variot³_{Mar.6,'95} observed that high temperature with corresponding rapidity of the pulse showed itself, varying according to the age of the children and form of the disease. The temperature rose from 0.5° to 1.5° C. (0.9° to 2.7° F.) and fell on the following day or the day after that, and in two or three days was normal, when no complications presented themselves. With a repetition of the injection the rise in temperature was not so regular; however, it often attained from 1° to 1.5° C. (1.8° to 2.7° F.) during the following eight hours. In many children with mild localized diphtheria the temperature rose after the first injection from 37° to 40° C. (98.6° to 104° F.) in from six to ten hours; in a physician suffering from diphtheria the temperature rose after an injection of 30 cubic centimetres (1 fluidounce) of serum from 37.1° to 40° C. (96.8° to 104° F.) after six hours. Corresponding to the rise in temperature following the injection of the serum, there appeared a rapidity of the pulse,—that is, of the action of the heart,—giving 160 beats for a temperature of 39° C. (102.2° F.).

Frequently there existed a distinct disparity between the temperature and the pulse; so that the frequent pulse-rate still existed when the temperature was already normal since two or three days. Among young children from 6 to 10 years old, whose pulse ordinarily is not so easily influenced, it rose to 140 or 160 after the injection, remained at that height from twenty-four to forty-eight hours, and continued at 140 when the rectal temperature was about 37.5° C. (99.5° F.), until it finally became normal in from three to five days, though not of normal strength or regularity. In half of the cases the pulse was weak and irregular during convalescence, it being often indifferent whether the diphtheria had been mild or severe. In children treated by serum, whom later bacteriological examination showed not to have been suffering from diphtheria, the same rise of temperature and rapidity of pulse showed themselves, and after four or five days the same weakness and irregularity of the pulse, together with arrhythmia of the heart's action. Since in these children there had occurred only catarrhal pharyngitis or laryngitis, which have no influence upon

the circulatory system, the serum only could have given rise to these alterations. The disturbances of the circulatory system lasted, in general, but eight to ten days, and often only three or four days. Among one hundred and fifty-four cases they caused no deaths and did not in any noticeable way hinder recovery, though they often were disquieting.

Fever and the tachycardia were likewise observed by Ricochon⁴²⁰_{Mar., '95} in patients with wounds infected with diphtheria who were treated by serum. Legendre observed a temperature of 41.5° C. (106.6° F.) twenty hours after the injection in a child of 5 years suffering from nasal diphtheria, and later on in other cases the disparity noted by Variot between the temperature and the pulse, which latter, after the fall of the temperature, for many days remained at 115 to 120.

Hutinel, Debove, and Sevestre also noticed a rise in temperature after the injection, and not only with the antidiphtheric serum, but also with the artificial serum of Hayem (sodium chloride, 5; crystallized sodium sulphate, 10; sterilized water, 1000) and with the serum of immunized animals. According to Hutinel these elevations of temperature following the injection of serum often give rise to serious danger, especially in tuberculous children. There are found a remarkably large number of children suffering from tuberculosis of the lungs or bronchial glands among those treated with serum and dying from the diphtheria, and since the greater part of these children die after the disappearance of the membrane it would appear that they die of the tuberculous affection, which until then had remained latent. Several German authors, on the contrary, have observed a prompt fall of temperature, accompanied by remarkably improved subjective sensations which are absent only when not enough antitoxin has been injected. Heubner²¹⁵⁸_{'95} goes so far as to claim a typically altered course of fever for the serum treatment.

Kurt Müller⁴_{No. 37, '95} states that at the beginning of treatment by serum, being alarmed by the sudden elevations of temperature, he was inclined to break off the antitoxin treatment, as a general rule, but he became convinced of its harmlessness in other respects. He took the temperature every half-hour, and noted that the rise was always an important one,—to 40° C. (104° F.) or more. Return to the normal was then very gradual when this took place, but the temperature often remains very high. Repetition of the injection caused a renewal of the effect produced.

Complications.—Exanthemata of various kinds were noticed by almost all observers who employed the serum. D. Walsh⁶⁹⁷_{Feb., '95} reviews this subject in an article giving the details of 80 cases, 25

of which showed what he terms the antitoxin rash, which appeared from seven to nine days after the first injection. Recalling a somewhat similar dermatitis following the use of tuberculin, which Walsh attributed to an attempted excretion of the tuberculin by the skin, the same theory, he believes, may account for the antitoxin rash. The skin-function is, to a great extent, analogous with that of the kidney; many substances of a chemical or organic nature, when introduced into the blood, may irritate in turn one or all of the channels of exit from the body,—as, for instance, bowel, kidney, or skin. If we take the poison of gout, presumably uric acid, we find that it may attack any excretory outlet, and that it is associated with various kinds of dermatitis, with pharyngitis, with bronchitis, with affections of the alimentary canal, and with nephritis. He suggests that these disorders are all of them different expressions of excretory irritation, acute or chronic. As is well known, the poison of scarlet fever irritates all excretory channels,—skin, kidneys, and mucous membranes. Dealing with that disease, Howship Dickinson has insisted that when skin-elimination is hindered by the use of inunctions there is an increased tendency to nephritis. Many drugs that cause skin-eruptions are found to irritate other excretory outlets. Iodine and bromine, when introduced into the system, are usually eliminated by the kidneys. Should iodine, however, be thrown off by vicarious channels, it gives rise to the group of symptoms known as “iodism,” characterized by coryza, gastro-intestinal troubles, and various forms of dermatitis. Moreover, in pustular forms of dermatitis due to bromine and iodine, both minerals have been found in the discharges by Adamkiewicz and Guttmann. The antitoxin treatment is often associated with kidney trouble; so that the drug has evidently an irritant action on one great excreting organ. Consequently, it does not seem altogether improbable that the rash on the skin may be due to the vicarious irritation of another outlet.

“The theory of excretory irritation would explain other clinical facts, such as the fugitive rashes noted in tuberculin treatment, in chronic constipation, in surgical scarlatina, in diphtheria itself, and in some ptomaine poisonings.”

[Taking the literature as a whole, it may be said that Walsh's view is supported in many directions.]

Pye-Smith⁶⁹⁷_{Feb., '96} does not ascribe the rash to the immediate effect of the puncture, for it appears in distant parts. It takes the form of a roseola, with well-defined margins, a bright pink color, and no papules, vesicles, or pustules. After twenty-four hours it begins to fade, and seldom lasts three days. There is little irritation and little smarting, and desquamation is either absent or

extremely slight. Its seat appears to be the limbs rather than the trunk or face. The eruption is manifestly allied to the occasional erythematous rash of rheumatism and the exanthems of measles and scarlatina, and thus additional evidence is afforded that these also are due to the circulation of chemical poisons.

Moizard and Perregaux, of Paris, ²¹²_{No. 24, '94} among others, observed exanthemata in 15 per cent. of cases treated by antitoxin. In a summary of 231 cases there were 14 cases of urticaria, 9 of scarlatiniform erythema, 9 of polymorphic erythema, and 1 of purpura, showing the varieties which may be encountered. These cutaneous manifestations, sometimes accompanied by pain in the joints, simulating articular rheumatism, were observed in numerous instances.

Diphtheritic paralysis was frequently met with, Monti's cases showing a proportion of 48 per cent., but whether this complication could be ascribed to the serum was not determined satisfactorily in the cases reported. Not only does the diphtheritic process seem to merit its share of blame in each case, but recent contributions have shown that even pseudomembranous angina may cause paralysis. Bourges, ⁴⁵⁷_{Jan. 1, '96} for instance, cites a case of a boy, aged 7 years, who, on June 12, 1894, complained of headache, sore throat, and had considerable fever. On examination the tonsils were found to be swollen and grayish in color, but no false membrane was seen. These symptoms, under treatment, disappeared in twenty-four hours. On June 21 a violent fever came on with slight coryza. On the next day a rubeolous eruption appeared on the face, neck, forearms, and legs. The throat was normal and the temperature fell after the appearance of the eruption. The latter disappeared on the second day and was not followed by desquamation. The child then remained well until June 30, when the symptoms first noted again appeared, accompanied by a very white, easily detachable, false membrane on both tonsils.

A few days later the mother became sick in the same manner, and a piece of membrane was taken from each throat for examination. The mother soon recovered, but the child remained pale and sickly after the disappearance of the membrane, and on August 5 was taken with night-terrors and grinding of the teeth, followed the next morning by pain in the abdomen, headache, and slight fever. On the following day a convergent strabismus was noticed. Two days later the voice became nasal and he coughed when swallowing liquids. These last symptoms quickly disappeared, but the strabismus remained stationary for fifteen days, and he did not recover wholly until the last of September.

A bacteriological examination by cover-slips, the making of cultures, and the inoculation of mice, all showed the same organism. Streptococci were found in abundance in the membrane from both patients.

A paralysis, therefore, presenting the same characteristics as that produced by diphtheria, affecting first the muscles of the eye, then of the palate, and later the inferior extremities, was caused by an angina which was not diphtheritic, as shown by examination not only of membrane from the child, but also of that from the mother who contracted the disease from the child.

According to d'Astros,⁴⁶_{May 15, '96} the effect of the serum manifests itself remarkably upon the menses. When employed at the time of its appearance, the serum increases menstruation, and, when used in the period between two menstruations, it gives rise to an earlier appearance of it. After a single injection a hæmorrhage occurs on the following day, or during the next few days, which often lasts as long as a normal menstrual period, the ulterior menstruations then become very irregular, both as to their duration and as to the intervening period. These observations suggest the question as to whether the congestive influence of the serum may not bring about abortion. However, no such trouble appeared in a four-month-pregnant woman suffering from diphtheria, who was injected with 30 cubic centimetres (1 fluidounce) of serum on the first day.

Tilatoff⁵⁸⁶_{p. 52 et seq., '94} observed that, after treatment of a case of diphtheria by serum, in a relapse which took place the symptoms were not once diminished by the serum. A 3-year-old child, suffering from mixed diphtheria with multiple œdemas and other severe symptoms, who recovered by four injections of Behring's serum, continued to suffer from mild coryza. Forty days after the injection he became ill from diphtheria with the same severe symptoms, and was cured by serum treatment. The bacilli appear to have continued to exist in the nostrils.

Untoward Effects.—V. A. Moltchanoff⁵⁸⁶_{No. 1, '96; Feb. 23, '96}² lays stress on the fact that the death-rate of epidemic diphtheria may oscillate without any relation whatever to the treatment employed, and that a low mortality was not unknown in the pre-serum days. The author himself recently observed a local outbreak of croupous and septic diphtheria attacking 39 persons, with 31 recoveries. Of the patients, 27 were aged from 1 to 14 years; 5 of them died. The remaining 12 were from 15 to 40 years old; 3 of them (adult men) succumbed to the disease. The treatment consisted in local application of HgCl_2 , Fe_2Cl_3 , tannin, boric acid, salicylate of sodium, etc.; internal use of stimulants, light fluid food, and rest.

Twenty cases were treated in the hospital, with 4 deaths, one patient dying an hour and a half after admission; 19 in private practice, with as many deaths. Of the 8 fatal cases, 5 (2 adults, 3 children) occurred in the beginning of the epidemic. The same thing has been observed by the author in every one of the sixteen epidemics of diphtheria he came across previously in the course of his country-practice; in each instance the initial period presented an enormous mortality in comparison with subsequent stages of the outbreak.

Leichtenstern and Wendelstadt, of Cologne,³⁴_{No.24,'96} are direct opponents of serum treatment, declaring that the antitoxic and diphtheria-neutralizing effect of the serum, in cases of pharyngeal diphtheria not operated, has not been proved and that a diminution of the general mortality has been attained only by a diminution of the mortality in cases upon whom tracheotomy has been performed. They have not observed a favorable influence upon the local and general symptoms of diphtheria, and they are unable to form the impression that, during serum treatment, the condition of diphtheria patients manifests a totally different and substantially more favorable aspect. They have observed no evil effects, however, of serum treatment.

Gottstein¹¹⁶_{Nov., '95} makes a severe criticism of Behring's statistics and points out that Behring has made errors in them, inasmuch as the number of cases of death given by the latter as occurring in the Berlin hospitals during 1894 is erroneous, and does not amount to 611, as Behring gives it, but to 840 cases, all cases of croup being excluded. Behring has likewise many times based his conclusions upon completely erroneous material, inasmuch as he makes the total number of patients for all Berlin equal to the number of those officially notified. The latter figures, however, are yearly more and more false since the introduction of compulsory disinfection in 1887.

Healy⁵⁹_{No.17,'95} does not think that the favorable results of the treatment of diphtheria can be attributed to antitoxin, inasmuch as the time of observation has been too short. Diphtheria describes in its mortality a rising and a falling curve, and we may now find ourselves in the latter. Even in a severe epidemic the mortality would be less if the reckless local treatment, the scratching and rubbing off of the membranes, were given up, by which only a new mode of entry for re-infection is produced.

[A year has passed since the above paper was written, and the early successful results are more than sustained.]

Purjecz¹¹³_{No.13,'95} submits the serum treatment to a severe criticism and says that it is impossible to judge it by statistics, as the course

of the cases of diphtheria not treated by serum is not known. The amelioration in general of patients suffering from diphtheria might arise from the fact that they are no longer locally treated.

Joseph E. Winters, of New York, ⁵⁹_{v. 47, p. 501, '95}; ⁵_{Aug., '95} relates his experience based on three months' daily observation in the Willard Parker Hospital, where 154 cases of diphtheria were treated with antitoxin, and gives a good outline of the objections brought forward by the method's antagonists. Taking four cases admitted in one day as a text, he states that in not one single case has there been the least evidence that the formation of the pseudomembrane was checked, that the exfoliation of the pseudomembrane was hastened, or that the throat was free from membrane earlier than in cases which have not been treated by antitoxin. In not a single septic case has the antitoxin made the least impression upon the symptoms. The toxæmia has not in one instance been relieved or lessened. There has been no indication in the character or frequency of the pulse, nor in the general condition of the patient, that a specific for the toxæmia had been administered. During the first three months of 1894 the death-rate at this hospital without antitoxin was 32 per cent.; during the corresponding months of 1895, with antitoxin treatment, the death-rate was 28 per cent., and this, too, when diphtheria was far milder than it was one year previous. The serum used in the early part of the antitoxin treatment was so weak that it was stated that but little could be expected of it. The record showed that the cases treated with the weaker serum did better than those which were treated with the stronger serum, and that those who had the smaller dose of serum did better than those who had a larger dose. In fact, a careful study of the individual cases will show that there is no relation between the antitoxin treatment and the recoveries.

A few deaths were reported during the year as due to antitoxin employed remedially. [To clearly establish the rôle of the serum in such cases would demand more knowledge regarding the manner in which diphtheria itself causes death than we, at present, possess.]

Immunity.—Wassermann ¹¹³_{No. 40, '94} in endeavoring to explain the resistance of certain individuals to diphtheria, especially at certain ages, examined the serum of a number of healthy subjects, and found that in those who had had diphtheria or even simple febrile angina the blood-serum had a marked and surprising antitoxic action toward diphtheria. A single cubic centimetre (15 minims) was sometimes sufficient to neutralize a dose of diphtheritic poison ten times larger than what might be considered as mortal. Serum

possessing such antitoxic properties was met with in 7 out of 8 persons over 40 years of age, in 10 out of 14 from 20 to 40 years, and in 5 out of 10 from 4 to 15 years. It appears from these researches that the antitoxic properties of the serum increase with age, thus explaining why diphtheria becomes rarer as childhood is left behind, and why it is possible to find diphtheria bacilli in apparently healthy persons. Wassermann regards these antitoxic properties not as hereditary, but as acquired, persons possessing it having been at some time or other submitted to the action of diphtheria bacilli.

Hermann M. Biggs²_{Aug. 31, '96} reports that remarkable results have attended the use in New York of diphtheria antitoxin for immunizing purposes. The conditions under which it has been employed have been peculiarly favorable for demonstrating its exact value. From May, 1892, to February 18, 1894, no cases of diphtheria occurred in the New York Infant Asylum, which ordinarily has about 400 inmates. From February 18 to September 1, 1894, there were 22 cases of diphtheria and 15 deaths. In September there were 16 cases, and from this time to February 10th—108 days—107 cases of diphtheria occurred. These were very evenly distributed over this time, about 30 cases developing in each month. In the latter part of October systematic bacteriological examinations of the throats of the healthy children showed that diphtheria bacilli were present in so large a number that, in order to isolate these, nearly one-half the inmates were quarantined. All efforts directed to checking the progress of the epidemic were unattended with success up to the time that antitoxin was employed for immunization. By the use of antitoxin it has been possible to completely stamp out diphtheria in four great institutions for children in which it was prevailing in epidemic form. In no instance have there been, so far as can be determined, any serious results from the administration of the remedy for this purpose. The duration of immunity is apparently not more than thirty days in many cases.

Allen M. Thomas, of New York,⁵⁹_{June 16, '96} reports that the total number of cases in the Nursery and Child's Hospital from January 18th, the time of outbreak, to April 18th, the date of immunizing, was 46. In all these cases cultures of the Klebs-Löffler bacilli were obtained, and observations of them doubly verified in most cases by the separate examination of the Board of Health and Mapes. In 30 of these 46 cases abundant local clinical aspects existed, there being well-marked pseudomembrane in the throat, nose, or larynx; the remaining 16 cases had only sero-purulent or sero-sanious nasal discharges as a local manifestation. Of the

entire number of 46 cases 15 occurred between April 1st and April 18th and 7 between April 11th and 18th, plainly showing the epidemic to be gradually on the increase in the hospital up to the day of immunizing. On April 18th 30,000 units of antitoxin were obtained from the Board of Health and 110 children immunized. On April 20th 26 more children were immunized, and the 32 remaining children in the hospital that had previously had throat- or nose- lesions containing Klebs-Löffler bacilli were not immunized. Of these cases immunized the following table shows the age, number, and antitoxin units:—

Age.	Number.	Antitoxin Units.
3 to 4 weeks	7	50
2 months	12	50-75
3 to 6 months	36	100
7 months to 1 year	22	150
2 to 4 years	59	200

No new case has broken out in the hospital since April 18th, the day of immunizing, with the exception of the assistant physician on the resident staff, who, about three weeks after the children were immunized, and one of the ward-nurses, who, five weeks after, developed well-marked cases of tonsillar and pharyngeal pseudomembrane, with both clinical and bacteriological evidences of true diphtheria. Neither had been previously immunized. This would seem to show very conclusively the continued presence of diphtheria bacilli in the hospital, and will make subsequent observation of the children still more interesting and instructive.

The conclusions, which seem not only justifiable, but fairly inevitable, to be drawn from the report are as follow : 1. The evident value of antitoxin in affording a certain period of immunity against the infection of diphtheria. 2. The apparent harmlessness of its use in this way with children even of tender age and condition. During the epidemic four nursing babies went to the diphtheria ward with their mothers, who were suffering with diphtheria. These babies were all injected and then stayed from two to three weeks constantly exposed to diphtheria without contracting it.

G. Morrill, of Boston, ⁹⁹Jan. 24, '95 reports that during 1894 there occurred three outbreaks of diphtheria, requiring the closing of the children's hospital in that city. On a fourth outbreak occurring, immunization was carried out, with the result that no fresh cases developed. It will be remembered that Roux informed the Congress in Budapest that he had injected 128 children, who suffered from various forms of sore throat, with 20 cubic centimetres (5 drachms) of serum, without observing the slightest unfavorable

result, and of whom not one was later on affected, though for many days they were exposed to contagion in the diphtheria pavilion of the Trousseau Hospital.

Lebreton and Magdelaine¹¹³⁹_{No.7,'95} do not recommend immunization on account of the evil effects of the serum (rise in temperature, affections of the kidney), and do not inject at once except in severe cases of diphtheria; in mild, localized forms doing so only after a bacteriological examination.

Variot does not look upon immunization as advantageous in a disease which can be so easily cured by the serum, and he recommends that the serum be employed against the disease of diphtheria, and not for the purpose of immunization. This objection from a partisan of serum treatment is perfectly logical, and it is supported by several instances in which the antitoxic serum injected as a prophylactic measure proved fatal in apparently healthy subjects. It is further supported by the fact that the immunization may not exercise its protective influence at once. A case in point is that of Guippius,¹¹³⁹_{No.11,'95} who immunized the father, two brothers (aged 4 and 14 years), and a sister (aged 9 years) of a child who had died of severe diphtheria, an injection of 150 antitoxin units being given. One sister of 12 years, who was already ill, recovered ten days after the first injection. On the same day the immunized sister was taken ill and recovered on the ninth day after several injections. In both cases Lœffler's bacillus was found. Both brothers supported the immunization well, but the father did not. On the seventh day after the injection he had a rigor with a temperature of 39° C. (102.2° F.), and at the place of injection there appeared an extensive erythema, painful on pressure. The fever, to which diarrhœa was added, lasted five days and diminished by lysis; two days later the erythema disappeared. Since Guippius noted urticaria but twice in fifteen patients, he looks upon any unfavorable effect as due to the quality of the serum. One woman immunized by him was so ill with severe pains of the joints after the injection that she was obliged to stay in bed five weeks.

Bókaï⁶⁹_{No.15,'95} tried protective inoculations in seventy cases, and thinks that they protect as well as the curative injections.

Torday⁶⁹_{No.25,'95} communicates some interesting experiments. From the 1st of January to the 9th of April he treated 13 children suffering from diphtheria in the village of Doboz, containing 5000 inhabitants; from the 25th of March to the 9th of April new cases were reported every other day. The number of children in the village under 1 year old was 152, and from 1 to 10 years 1323. On the 11th, 15th, and 17th of April he inoculated 494 children,

together with those ill and the latter's relatives, equal to 35 per cent. of the children up to 10 years of age, from 150 to 200 units of Höchst serum being employed. According to official communications, since the 17th of April no patients suffering from diphtheria have presented themselves in Doboz.

Johannessen³⁶⁹_{Mar., '96} immunized 26 individuals with 1 cubic centimetre (15 minims) of Behring's No. 1 serum. Of 3 of these patients, in whom the bacillus of diphtheria was found, 1 soon became ill from diphtheria, and in the 2 others the bacilli were found on the twenty-first and thirtieth day, respectively, examinations being made every two days. Of the other immunized patients 1 was attacked by diphtheria eight weeks after the injection; in a second case diphtheritic membrane appeared fourteen days after the injection, and in a third case croup developed twenty-two days after the injection, which was exceedingly ameliorated by serum No. 1, but consecutive pneumonia caused the death of the child. Another child was affected fourteen days after the injection with fibrinous rhinitis and diphtheria bacilli. An examination of the mouth and nostrils of 22 patients and deaconesses was made, and typical diphtheritic bacilli were found in 4 instances, 1 of the cases being that of a 14-month-old dyspeptic boy. The bacilli found lasted eleven days longer, and caused the death of guinea-pigs in about three days. One of the immunized boys was troubled with serious urticaria, another with spastic spinal paralysis, dying ten days after the injection. The post-mortem examination revealed follicular enteritis, and streptococci were found in the exudations and the blood of the heart. Johannessen, however, does not look upon the injection as the cause of this death.

Carl Goebel⁵⁸⁶_{No. 52 et seq., '04} reports two cases showing that, while curative injections of serum only furnish relative immunity, the same is the case with prophylactic injections, which, according to many authors, protect the subject but fourteen days. Neither are the dangers of a consecutive attack of diphtheria reduced. This is shown by a case described by Tilatoff, in a family in which three children suffered from diphtheria; the fourth child, which had received protective serum, remained in good health, while the maid-servant, who was not immunized, contracted diphtheria and died. Four months later, the three children having in the meantime been in good health, the child which had been previously immunized was infected with diphtheria; the pseudomembranes rapidly vanished after a single injection, but the child died of paralysis of the heart.

A case is related by Pistor,⁴¹_{No. 24, '96} that of his own 7-year-old

daughter, suffering from sore throat, who was injected on the 25th of April with 900 units, without waiting for bacteriological examination. On the 1st of May, after the fever had left her and when the general condition was passable, itching of the body manifested itself in the morning; at midday erythema of the size of the palm of the hand was present without elevation of temperature, and on the following day pain in the knees with great weakness. On the 9th of May there was a tendency to vomit, pains in the left trochanter, and rise of temperature to 38.4° C. (101.2° F.). On the 10th of May there was a scarlatinoid redness of the whole body, much pain in the muscles and joints, and, during the following night, at intervals of from twenty to thirty minutes, clonic convulsions in both thighs, with pains in the arms and maxillary joints; the masticatory muscles were hard for a short time, but in them it did not amount to convulsions. The symptoms vanished slowly, and the patient was able to leave her bed for the first time on the 17th of May. On the 21st of May there appeared a new miliary eruption over the body, with pains in the calves, and on the following day formation of weals. Until the 11th of June the appetite was absent, sleep was broken, and there was dullness and an inclination to chilliness. On the 15th of June great pruritus and an exanthema developed on the right breast, and on the 16th on the abdomen and thighs. The child appeared normal after the disappearance of the exanthema.

Rojanski¹¹³⁹_{No. 23, '96} immunized 100 scholars, of whom but 1 suffered from diphtheria, and Müller¹¹⁶_{Feb., '96} immunized 125 brothers and sisters of children suffering from diphtheria with 120 units of antitoxin. During the first three months, out of 121 cases 3 children had suffered from diphtheria,—1 after four weeks (with severe post-diphtheritic paralysis), 1 after fourteen days, and 1 after two and a half months. In addition, 1 child suffered two and a half months later from diphtheria of the eyes. Of 46 non-immunized children who lived in close contact, amid only tolerably hygienic surroundings, with diphtheria convalescents, 1 only was attacked by the disease.

Behring has several times stated that untoward effects may be avoided by injecting but very small quantities of serum for prophylactic purposes and by using only serum known to be in the best possible condition.

Variot¹¹³⁹_{No. 17, '96} attributes the unfavorable results of serum treatment to the fact that the serum is not an homogeneous liquid, and that, from its wholesale manufacture, it is not always completely clean and sterile. The serum of the Pasteur Institute has the reddish hue of hæmoglobin and often contains red blood-corpuscles.

Variot has lately observed many abscesses following injections which were made with antiseptic precautions. R. Drew, of Hamburg, ¹¹⁶_{Feb., '96} states that a physician in Kasan discovered even septic micro-organisms in Behring's serum. The serum, which is the vehicle for the antitoxin, is a substance fermenting readily and easily destroyed, affording a good medium of culture for septic micro-organisms, and would cause serious suppurations if not absolutely sterile. It accordingly becomes very necessary to separate the antitoxin from the albuminous vehicle,—an endeavor already made at the British Institute of Preventive Medicine.

Dosage, Comparative Merits of Serums, etc.—E. Klein, of London, ²_{Jan. 12, '96} states that, while Rose published a report adverse to the antitoxin treatment, his notes show that a case treated with his (Klein's) antitoxin received 10 minims (0.65 gramme) as a first dose, and next day again 8 minims (0.50 gramme). Klein asks Rose and Macgregor, who administered the second injection, why they injected 10 minims (0.65 gramme) and 8 minims (0.50 gramme), respectively, when the indicated dose is from $1\frac{1}{2}$ to 2 drachms (6 to 8 grammes) which is plainly shown on the label.

[This instance is merely mentioned as an example of several that could be quoted. The hypodermatic injection of a toxic agent naturally inspires a certain amount of timidity, and a reduction of the dose is the result. The remedy is then considered as valueless and an adverse report published to the world. As already shown, a definite quantity of antitoxin is required to neutralize a definite quantity of toxin, and, unless the proper dose is used, the effort made to relieve the sufferer must be relegated to the position of an experimental study upon a living being and published as such.]

Early in the year the Pasteur Institute published instructions based upon a close study of the question by Roux. ²²_{Mar. 20, '96} The following are the points of practical interest: Antidiphtheritic serum preserves its properties if kept in a cool temperature and not exposed to the light. At a temperature of over 50° C. (122° F.) the serum becomes inactive. A small quantity of camphor is added to preserve the serum. Preventive action: Employed in doses of 5 cubic centimetres ($1\frac{1}{4}$ drachms), the serum confers immunity against diphtheria which lasts from four to six weeks, and preventive injections may, therefore, be made in persons exposed to the contagion. The preventive power of the serum issued by the Pasteur Institute is at least 50,000,—that is to say, it suffices to inject a guinea-pig with a quantity of serum equal to $\frac{1}{50000}$ of its weight in order to enable it to bear, without being affected, a dose of virulent culture of toxin capable of killing guinea-pigs

in less than thirty hours. This power corresponds to about that of Ehrlich's serum of 100 to 200 units. Therapeutic action: Injected in sufficient quantity, the serum cures the patient when the disease has not advanced to too late a stage. The dose varies with the age of the patient; 5 to 10 cubic centimetres ($1\frac{1}{4}$ to $2\frac{1}{2}$ drachms) are enough for benign cases taken at the onset; 15 to 20 cubic centimetres (4 to 6 drachms) are needed in severe cases or when they have passed several days; and up to 30 cubic centimetres (1 ounce) or even beyond may be called for in very severe cases, notably in those in which tracheotomy has been called for. It is impossible to state definitely the quantity which will cure a given case of diphtheria. This must be regulated by the temperature, the pulse, and the general condition of the patient. So long as the rectal temperature does not fall below 38°C . (100.6°F .) the disease cannot be considered at an end. Usually the false membranes became detached within twenty-four hours if the injected dose be sufficient. When the breathing is embarrassed tracheotomy may often be rendered unnecessary by an injection of from 15 to 20 cubic centimetres (4 to 6 drachms) of serum, followed by another of from 10 to 20 cubic centimetres ($2\frac{1}{2}$ to 4 drachms) if the improvement is not satisfactory. It is better to inject at the onset a dose of serum stronger than actually necessary and capable of cutting short the malady rather than to inject weak doses at intervals. In infants under 1 year old as many cubic centimetres (15 minims) may be injected as the child numbers months. In adults it is not necessary, unless the case be extremely grave, to inject more than 15 to 20 cubic centimetres (4 to 6 drachms) the first time, their power of resistance to the disease being much greater than in infants. The necessary quantity being injected, no more need be employed without evident need. The necessity for perfect asepsis is insisted upon.

Behring, ⁶⁹_{Nov. 15, '94} along with Ehrlich, found that in communities in which diphtheria existed 60 units, or one-tenth of the curative dose, were sufficient to afford protection. Among 10,000 thus treated only 10 acquired diphtheria. Those who have developed diphtheria after the exhibition of 60 units have had a mild attack; nevertheless, the author recommends 150 units. When the infection has been virulent, and treatment instituted toward the close of incubation, 600 units, a full curative dose, may be unable to prevent the development of the disease. Antitoxin is excreted by the urine, and immunity ceases when all is eliminated. Several small doses at intervals are more serviceable than a single large dose. The author prefers a concentrated serum.

That 600 units is by all means the most beneficial dose is

strikingly proven in the collective investigation of *The Deutsche medicinische Wochenschrift*, bearing upon 10,312 cases. The mortality in cases in which 600 units were given was: in children under 2 years, 16.1 per cent.; in those between 2 years and 10 years, 5.3 per cent.; and in those above 10 years, 1.8 per cent.,—an average percentage of 6 for the three groups; when 1000 units were used the deaths in the three classes were, respectively, 33.6, 13.8, and 7.5 per cent.,—an average percentage of 14.6.

W. H. Park,³⁶¹_{Dec. 2, '95} after an experience based upon a large number of cases, concludes that the total quantity required in a case varies from 1000 to 4000 units of Behring's standard, according to the weight of the patient and the severity of the disease.

Scalvo⁹¹⁵_{No. 6, '95} examined by Ehrlich's method the value of various serums, and found that they were weaker as regards immunization units than was announced. Behring's No. 1 serum contained but 33 units, No. 2 but 60, and No. 3 less than 60; while the bottles, according to the labels, should hold 60, 100, and 140 units. Roux's serum, which should contain 100 units, contained but 60, and Aronson's serum contained but 33 units. The serum of Belfanti and that of de Martino, of Milan, contained a little more than 60 units, but none contained 100.

Kasembec¹¹³⁹_{No. 23, '95} prefers Roux's serum, having found many flasks of Behring's serum infected with cocci and even with Loeffler's bacilli.

[This is noted merely to illustrate the vital importance of securing serum presenting the highest standard in every particular. The best of serums, whether Roux's or Behring's, may, as shown, assume virulence under certain conditions.]

An article by Janovski, of Warsaw,⁵²⁰_{No. 4, p. 79, '95} is reviewed by Valerius Idelson, of Berne,²⁶_{Apr. 1, '95} in which the comparative effects of Behring's and Roux's serum are compared, the comparison being based on a series of experiments on guinea-pigs. Janovski found (1) that the power of Roux's serum is equivalent to that of Behring's No. 1; (2) that a serum possessing a power equal to $\frac{1}{50000}$, according to the French terminology, is equivalent to Behring's serum with a "power equal to 60 immunizing units"; (3) Behring's serum No. 2 is twice as strong as Roux's preparation; (4) the price of 1000 immunizing units, administered in the shape of 10 cubic centimetres ($2\frac{1}{2}$ drachms) of Behring's "serum No. 2," is 11 marks (\$2.75), while the corresponding number of units, injected in the form of 20 cubic centimetres (5 drachms) of Roux's serum, costs only 6 francs (\$1.20); (5) in view of the fact that the therapeutic effects of the rival preparations are absolutely identical, the cheaper French serum should be

preferred to the enormously expensive article supplied by the Hoechst works.

Idelson severely condemns the more than exorbitant prices thus imposed upon sufferers and the philanthropic public by the German firm, and terms it one of the most disgraceful episodes in the annals of the century.

Preparation of Antitoxin.—With a view to shortening the time required for the preparation of the antitoxin of diphtheria, by any of the methods thus far employed, Klein⁶_{No. 3720, '95}; ⁵July, '95 makes a few injections of living diphtheria bacilli attenuated by age, together with their toxin. The animal treated is thus furnished with a certain degree of resistance. Next, large quantities of living diphtheria bacilli (minus their toxin), taken from the surface of solid cultures of gradually increasing virulence, are repeatedly injected subcutaneously, so as to allow the bacilli to grow and multiply and gradually to produce within the body of the animal the toxin, and ultimately the antitoxin. Each injection is followed by a temporary reaction,—a rise of temperature varying between 0.6° and 1.8° C. (1.08° and 3.24° F.) and a local tumor; but there is no suppuration at the sight of inoculation. As soon as one such tumor has disappeared a new injection is made with large quantities of living bacilli scraped from the surface of solid media (agar and gelatin). By the third week the animal will bear the scrapings from the surface of two whole agar cultures of virulent character. In the case of one horse, antitoxic serum was obtained by this method in twenty-three days and in that of another in twenty-six days from the date of the initial injection. If after the first bleeding the horse be again twice or thrice injected with virulent living diphtheria bacilli (taken from surface cultures), the further serum obtained will be found to possess increased antitoxic power.

A. P. Ohlmacher⁹_{Mar. 16, '96} describes his method of manufacturing antitoxin. He rejects the special flasks employed for growing the toxins and abolishes the current of air suggested by Fernbach, and does not attempt to increase the virulence of the bacillus by artificial culture means. In cultivating the bacillus the flasks are agitated once daily so as to distribute the bacilli, which tend to settle at the bottom of the flask. The cultures grow for two to three weeks, are trikresolized, and then filtered. Light was not found to change the toxins. The one horse upon which the observations are based was immunized in a very short time. The first injection of 0.5 cubic centimetre ($7\frac{3}{4}$ minims) was given December 20, 1894, the last dose of 250 cubic centimetres ($8\frac{1}{4}$ fluidounces) February 5, 1895,—forty-seven days in all. Eleven

injections were given. The blood was not taken with a trocar, but a careful dissection was made, two inches of the jugular vein exposed, a snip made into it with scissors, and the blood caught as it flowed from the opening made to gape with a dull hook. One per cent. of sodium salicylate is most strongly recommended instead of camphor, phenol, or trikresol as a preservative for the serum. The points upon which emphasis is laid are as follow: 1. The necessity of obtaining a pure culture of a highly-virulent diphtheria bacillus. 2. The fact that the toxins may be made by simply growing the bouillon cultures . . . in the incubator (in ordinary flasks) for two or three weeks, then adding $\frac{1}{2}$ per cent. of trikresol and filtering. 3. The secret of a highly-potent toxin lying in the virulent characters of the organism employed. 4. The fact that the immunizing injections in the horse can be pushed more rapidly than is usually done. 5. The fact that a number of small vesselfuls of blood will yield more serum than a single large vesselful. 6. The advantages of sodium salicylate as a preservative agent (1 per cent. is added to the serum) for the diphtheria antitoxin.

Arloing, of Lyons, ²¹¹_{Nov. 24, '95} in an article on the preservation of antidiphtheritic serum, recommends the greatest care in filling the flasks and in sealing them, using corks covered with paraffin and sterilized at a high temperature.

A clear and comprehensive article on the preparation of diphtheria antitoxin is presented by Charles B. Fitzpatrick, of New York. ¹_{Apr. 27, '95}

A. E. Wright and D. Semple, of Netley, ²_{Oct. 12, '95} recommend the following culture-medium for Loeffler's bacillus: A small quantity of the antitoxin is to be poured into any clean, small, wide-mouthed bottle. It is then coagulated by holding the bottle in an horizontal position over the mouth of a steaming kettle, from which the bottle is to be removed as soon as the serum is coagulated. The water of condensation is to be poured off, and the coagulated serum may then be inoculated and treated like any other tube of ordinary serum. They likewise recommend that the plasma, rather than the serum, of immunized animals be used as an injection material. It can be prepared by leading off the blood from the horse's vein into a little citrate of soda dissolved in normal salt solution, 5 grammes of the former for every 1000 cubic centimetres of blood being all that is required, provided that the tube through which the blood is led into the receiving vessel reaches quite down to the bottom of the vessel so as to insure complete mixture. The antitoxic plasma may then be siphoned off from the layer of blood-corpuscles.

An article by Fischer, of New York, ⁵⁹_{Apr. 6, '95} upon the contra-indications for the use of antitoxin and the technique to be observed when injections are administered, may be said to represent the views of the great majority of the authors who have so far given such details. The contra-indications for the use of antitoxin, according to the author, are: 1. Cases of mixed infection; cases of a scarlet fever complicating diphtheria; cases of measles complicating diphtheria; cases of chicken-pox complicating diphtheria, and so on. 2. Cases that are moribund. 3. Cases that appear to be true septicaemia, where we have rather a result of the diphtheria than a real diphtheria to contend with. 4. Cases which show a distinct evidence of casts and large quantities of albumin should not be injected with antitoxin.

In the application of the remedy the following suggestions are offered: 1. To apply the remedy as soon or as early in the disease as possible. 2. To inject a sufficient quantity. 3. To remember that the remedy is absolutely harmless. 4. That it can be used for prophylactic purposes by injecting the one-tenth part necessary for healing an acute case of diphtheria. 5. That the use of antitoxin does not render local antiseptics, the use of stimulants, and careful hygienic regulations unnecessary.

The technique of the injection consists: 1. A careful sterilization of the skin at the seat of injection,—the interscapular space or the pectoralis region. Sterilization consists in washing the skin with soap and warm water, then sponging with a 1000 to 2000 sublimate solution. 2. The hands of the physician must be carefully cleaned and rendered aseptic. 3. The syringe should be completely sterilized by boiling for fifteen minutes in a soda solution. The needle should be dipped in alcohol, followed by a 2-per-cent. solution of carbolic acid. 4. It is necessary to inject slowly, at the same time to have the proper quantity of serum drawn into the barrel of the syringe so that no time is lost. The needle should be pushed into the deep cellular tissue at least two inches in a semihorizontal position. 5. Massage of the fluid injected should not be practiced. Finally, it is well to apply a very small pledget of absorbent cotton over the injected space. The injected spot can also be sealed by dropping collodion over it. The absorption of the antitoxin takes usually from one-half to one hour.

If given with the above precautions the author considers it a safe remedy, capable of curing every case of diphtheria which is treated early.

To sum up this review on the antitoxic-serum treatment of diphtheria, the conclusions formulated by Sims Woodhead, in an admirable paper read before the British Laryngological Associa-

tion, ¹¹_{Sept., '95} may be quoted: "The injection of antitoxic serum has been shown conclusively to antagonize the action of the diphtheric toxin in the body. If injected early in the disease there is every prospect of effecting a cure in a large percentage of the cases, —in fact, in all cases where the amount of toxin is not so great that the tissues are actually paralyzed and are unable to react to the antitoxin. Even in the later stages, however, some cases could be brought round that would probably not otherwise recover. It could not make good any organic lesions already caused by the toxin, and these must be left to the *vis medicatrix naturæ*. The patient is, however, rendered more comfortable by the injections. Antitoxin, though it lessens the proportion of cases in which tracheotomy is necessary, does not dispense with it altogether, but it would probably enable them to have recourse to intubation in a larger number of cases calling for assistance of this kind. The prophylactic treatment is now within the range of possibility."

Medicinal Treatment.—In the opinion of Fürst, ⁴⁷⁵_{Mar., '95} antitoxin treatment is of use when the process is not limited to the site of invasion. Its drawbacks are its uselessness in septic secondary infections and in diphtheria of the bronchi, while it involves certain possible after-effects. Local treatment should never be neglected.

Lennox Browne ²²_{No. 2010, '95} also concludes that the accumulated evidence of Hanseman, Baginsky, Ringer, Washbourn and Goodall, Benda and Monti confirms his personal views that there is an increased tendency to nephritis, cardiac failure, and septicæmia in cases treated with this remedy over what was formerly observed under the old treatment. Recognizing the importance of the latter, older measures should by no means be omitted at the present time. Renal activity must be assisted and every precaution taken against sepsis from whatever source that might increase the liability to erythema and joint pains, evidently of a toxic character and out of proportion in frequency of occurrence to what has been hitherto observed.

Wachsmuth ²¹⁶⁰_{'95} entirely rejects serum, believing that he obtains better results with a treatment which he has used for the past thirty years. This consists in methodically carried out wet packing. Diaphoresis is stimulated and the natural efforts of the organism to relieve itself of toxic elements and to produce defensive products against the toxins given out by the diphtheria bacillus are thus encouraged. In addition, he gives hydrochlorate of quinine and hydrochloric acid internally, gargles with salt water and, in diphtheria of the larynx, the cold-water spray. In septic diphtheria he employs corrosive-sublimate inhalations.

Wachsmuth estimates the mortality at about 3 per cent. in nine hundred cases.

Goubeau and Hulot ³⁶⁰_{Oct., '94} find that the use of a concentrated solution of sublimate in glycerin (1 to 20) gives better results in diphtheritic angina than any other measures. The applications are easily made by the persons in charge of the patient, under the supervision of the physician, and are well borne. Two applications, preceded by a boric-acid spray, are generally sufficient for twenty-four hours, but, if the case is especially grave, the applications may be made three or four times in twenty-four hours. They should be confined as much as possible to the false membranes, and no attempt should be made to detach the latter, the excess of sublimate being immediately removed with a dry cotton-forceps. When the applications cause pain, which is rarely the case, this may be relieved by cold water sprayed over the surface. There is no burning of the pharynx and the solution is not at all caustic. The false membranes are speedily influenced by the remedy, and seem to dry up without being reproduced. Secondary infection and adenopathy rapidly disappear, the general condition improves, and in a couple of days the benefit is very manifest. Albuminuria, when present, soon diminishes and disappears, and the Klebs-Löffler bacillus is no longer found in the throat after recovery. The mortality by this method, according to the authors, is 4.7 per cent.

Moizard, ¹¹_{Dec., '94} with bichloride of mercury in solution in glycerin, has treated one hundred and twelve cases of diphtheritic angina, and had ninety-four cures. The solution employed varied from 1 in 20 to 1 in 30 in pure glycerin. With small cotton tampons soaked in the solution the author paints the patches two or three times a day. It is necessary to remove with pure cotton the excess of solution, so as to prevent toxic action of the mercurial salt. He employs at the same time antiseptic washings of the mouth and nose and general tonic treatment.

J. Henry Fruitnight, of New York, ¹⁴⁷_{July, '95} highly indorses the method of calomel sublimation, and reports cases where it rendered intubation unnecessary. Its special indication is laryngeal stenosis, as shown by stridulous breathing, hoarseness, or aphonia and lividity of the surface from deficient oxygenation of the blood. The child's bed is covered with a tent made with a sheet. Beneath this tent is then placed a calomel powder on a tin plate over an alcohol-lamp. The vapor from the burning calomel is confined in the tent and thus inhaled by the child. The proper amount to use at one time is about 15 grains (1 gramme), the duration of inhalation should be ten minutes, and the process is to

be repeated every half-hour to two or three hours, depending on the urgency of the case.

J. S. Carpenter, of Pottsville, Pa., ⁸⁰_{Sept. 15, '94} is convinced from personal experience that corrosive sublimate is the one remedy in diphtheria on which the greatest reliance can be placed, and, unless there be an idiosyncrasy on the part of the patient, the system shows a surprising tolerance for the drug. He also urges the necessity for the early administration of strychnine in severe cases, to avert cardiac complications, and of rest in bed, even for mild cases. Local treatment is of value, but it must be supplemented by measures designed to overcome the septicæmia occasioned by the local lesion.

From experiments on dogs Kersch ⁸_{No. 51, '94} found that subcutaneous injection of a solution of iodide of potassium and salicylate of sodium caused cure of diphtheria, even when made two or three days after the disease had been inoculated. When made the same day the animals showed no symptom of the affection. Of thirteen cases of croup and diphtheria treated by the same injections, eight recovered. One of the others came under treatment only on the fifth day, and in two the method was not vigorously carried out. Kersch gives to adults the following prescription internally:—

R Iodide of sodium, 3.00 grammes (46 grains).
 Salicylate of sodium, 5.00 grammes ($1\frac{1}{4}$ drachms).
 Distilled water, 200.00 grammes ($6\frac{2}{3}$ fluidounces).
 Raspberry-syrup, 30.00 grammes (1 fluidounce).
 M. Sig.: A tablespoonful every hour, or two if the danger is imminent.

In children to whom it is possible to give this mixture, he makes two daily hypodermatic injections of the following solution:—

R Iodide of sodium, 1.00 gramme (15½ grains).
 Salicylate of sodium, 2.50 grammes (39 grains).
 Distilled water, 10.00 grammes ($2\frac{1}{2}$ fluidrachms).—M.

Or a single daily injection of the following:—

R Iodide of sodium, 2.00 grammes (31 grains).
 Salicylate of sodium, 5.00 grammes ($1\frac{1}{4}$ drachms).
 Distilled water, 10.00 grammes ($2\frac{1}{2}$ fluidrachms).—M.

The slight symptoms of iodism caused in children are of no importance.

Benesch ²⁸³_{No. 4, '95} has treated thirty-two cases with injections of pilocarpine, all recovering. He prefers this method to antitoxin treatment, because the good effect is manifested in a few minutes in decrease of the temperature, and the general results are very

satisfactory. C. F. Howe, of Atchison, Kan., ¹⁹⁹_{Aug., '95} considers pilocarpine as a specific in diphtheria.

Degle ¹¹³_{Dec. 9, 16, '94} is also a partisan of pilocarpine in diphtheria, which he regards not as a specific, but as a precious auxiliary, shown to be superior to the other drugs daily used in pharyngeal and laryngeal diphtheria. It is less dangerous for children than for adults, in whom the heart is frequently overworked, as in patients with previous diseases or those with the alcohol or tobacco habit. The author gives it in solution, reserving the hypodermatic injections for cases in which it is necessary to act quickly.

F. Kastorsky ¹⁰⁷_{Aug. 15, '95} reports thirty-seven cases of diphtheria in three adults and thirty-four children treated and cured by painting with a 10-per-cent. alcoholic solution of menthol. The paintings, by means of a piece of cotton-wool, were usually carried out three times daily. In some cases, however, a single free application was followed by complete disappearance of the false membranes within two days. A marked improvement in the patient's general condition was invariably noticed from the beginning of the treatment. The same simple method was invariably practiced by the author in numerous cases of anginas of various forms, and by Triitovsky in a group of cases of scarlatinal diphtheria. The paintings are said to be painless and quite harmless.

Emmett Holt, of New York, ²⁰²_{June 10, '95} advises the early use of strong hydrochloric acid, especially in cases beginning on the tonsils; local cleanliness, by the use of a weak antiseptic solution in the pharynx; nasal syringing, with the same solutions, in every case where there is nasal discharge; alcoholic stimulants, begun as soon as the first systemic effect of the poison is seen, and in very severe cases pushed to the point of tolerance; calomel fumigations as soon as laryngeal symptoms appear; intubation in laryngeal cases not relieved by fumigations.

A. Campbell White, of New York, ⁵⁹_{Nov. 3, '94} concludes as follows, from a series of cases of his own, together with investigation and observation on a much larger number of cases: 1. That frequent washing of the air-passages attacked by diphtheria lessens the duration and amount of diphtheritic membrane. 2. That the addition of antiseptics, in sufficient strength to be germicidal, to the irrigating fluid is irritating to the mucous membrane, thereby causing extension and persistence of false membrane rather than the effect desired. 3. That the addition of antiseptics to the irrigating fluid is liable to cause systemic poisoning and disagreeable complications from the swallowing and absorption of some of the fluid used. 4. That spraying the throat (also the pernicious treat-

ment of swabbing), whatever solution is used, can have no good effect, as the parts reached by the spray must necessarily be very limited, excepting possibly in the hands of an expert. Furthermore, the spray cannot be used with young children, as any one can testify who has tried it. This is especially true of some solutions where it is necessary to use a glass syringe. 5. That frequent cleansing of the throat and nasal cavities with a bland solution, such as plain warm water or normal salt solution, is easier of application, is more agreeable to the patient, and does all that any antiseptic solution can accomplish, either upon duration of the membrane or the period of isolation.

[Plain warm water is irritating to the nasal cavities, owing to its blandness. An alkaline solution—say, of 1 drachm (4 grammes) of chloride of sodium or bicarbonate of sodium to the pint of lukewarm water—will not cause pain, whereas plain water will.]

Berg, of New York, ⁵⁹_{Jan. 12, '96} gives his experience at the Willard Parker Hospital with a series of cases which were subjected to local irrigation with warm salt solutions every one to three hours; a second series were subjected to this treatment, and, in addition, were sprayed every three hours with peroxide of hydrogen, in the shape of pyrozone, recommended by Northrup, varying in strength from 5 to 25 per cent., according to the severity of the case; and a third series of cases were subjected to irrigation by a 1 to 3000 or 4000 solution of the bichloride of mercury. It was found that while the average number of days in which membrane persisted in the throats of those treated by salt-water irrigation was only six to nine days, under bichloride irrigation the average duration was seven to nine days, while with salt water and pyrozone it was nine to sixteen days. The bacilli, however, persisted in the salt-water cases for 10.2 days, while in the bichloride cases they disappeared seven days after the disappearance of the membrane, and in the pyrozone and salt-water cases 9.6 days. It would appear, therefore, that a mechanical washing away of the diphtheric products is best accomplished by the warm salt-water irrigation, probably because, being harmless, it can be used in much larger quantities than a germicidal solution, such as the mercurial sublimate; but the bacilli and probably, what is more important, the toxic products disappear most rapidly under a bland germicide like corrosive sublimate, or, what is equally good, a solution of boric acid 1 to 30, or a tablespoonful to a pint of water. The latter solution he uses without salt water, it being sufficiently mild to use in large quantities.

Buckingham ⁹⁹_{Feb. 14, '96} calls attention to the fact that rest is so important in maintaining the general strength that any treatment

involving frequent serious disturbance of the patient ought to be looked upon with great suspicion. Disturbance of rest may do more than wear out the strength; it is just possible that it may increase the area of the local lesions. Several cases are cited in which light exercise in the ward sufficed to greatly increase prostration and the production of false membrane. Placing great stress on economizing strength, the author thinks that care should be taken not to abuse the use of steam, which tends to produce a depressing atmosphere, especially if concentrated about the bed by means of a tent.

Prophylaxis.—Sziklai⁷⁹_{Nov., '95} uses pilocarpine in cases in which diphtheria is present, but he recommends its use as a preventive. The author argues that when a case of diphtheria is present there is never any certainty that an epidemic is not threatened, and that the second case in the same family may or may not be polymicrobial. As a prophylactic, he administers a 1-per-cent. solution of the hydrochlorate three times a day, in 10-drop doses. For children under 1 year half of that dose will be sufficient.

Solomon Solis-Cohen, of Philadelphia,⁹_{Jan. 5, '96} recommends the topical application of guaiacol as a probable prophylactic against diphtheria in the cases of attendants upon diphtheria patients, and of children and others residing in the same house with diphtheria patients.

The guaiacol, which should be a pure preparation, is best applied with cotton-wad, and by quick motion, first to one tonsil, immediately afterward to the other tonsil, and after an interval of two or three minutes to the pharynx. Some burning or smarting is caused by each application. This, however, passes off in the course of a minute or two, or, if unexpectedly severe, may be relieved by ice or iced water. Latterly he has used as a diluent for guaiacol a 5-per-cent. solution of menthol in liquid petrolatum, and the peculiar cooling effect of the inhalation of air after the use of mint seemed to be an advantage. There is no caustic or escharotic effect from pure guaiacol.

Foster Godfrey, of Mimico, Can.,⁸⁰_{June 15, '95} in an article on tonsillectomy as a preventive measure against diphtheria, gives his experience in treating an outbreak which became epidemic in February, 1893, among the two hundred boys of the Victoria Reformatory at Mimico, Can. He had fifty cases at one time, of which forty-three gave a history of having one or both tonsils hypertrophied. Since June of 1893 over one hundred tonsils have been removed. There has not been a case of diphtheria in the institution since April, 1893, although it has been prevalent in its most virulent type every winter and spring in the neighboring

town and adjoining country. Even the boys who were subject to yearly attacks of "quinsy" have passed safely over the ordeal of the trying winters, because, as Godfrey concludes, the tonsillotomy has removed the location, so to speak, of the disease. Without claiming that tonsillotomy removes all danger of contracting the disease, he urges that the susceptibility is greatly lessened, and, if the disease be acquired, the chances of recovery are greatly increased. After the removal of the faucial tonsils the post-nasal space should be cleared of any adenoids that may exist.

Intubation and Tracheotomy.—Bokai⁶⁹_{Nov.14,96} published a valuable report upon 763 cases of severe diphtheria in which intubation was resorted to. Of the 763 cases 268 recovered. Ninety cases, with 45 recoveries, occurred since the introduction of the serum treatment. Out of the 673 before the serum treatment, 223 recovered, and only in 8 cases was a secondary intubation necessary. The duration of the intubation was from $\frac{1}{4}$ hour up to 240 hours, except in 7 cases, where it exceeded 10 days. In 62.77 per cent. the tube was in under 72 hours, and in 82.33 per cent. under 120 hours. The author gives details of cases in which the duration was under 24 hours, and also of 2 cases in which it was 349 and 360 hours, respectively, the latter being the longest time. The mean average duration was 79 hours in the 215 cases. It is the author's custom to withdraw the tube after 48 hours; in the 27 cases where the tube was out before this time, it was due to the child expectorating it or pulling it out by the string and to the further introduction being deemed unnecessary. In the 45 intubated cases of recovery under the serum treatment a secondary tracheotomy was only once necessary. The minimum duration of intubation was 2 hours, the maximum 168 hours. In 77.26 per cent. of these cases the tube was left out within 72 hours. The author gives tables which show that, under the serum treatment, the number of cases in which the tube can be left out within the first and second 24 hours is greatly increased. He compares these figures with those obtained from observations on withdrawing the cannula in tracheotomy, where the results are very different. Although the tube remained in over 5 days in 16.2 per cent. of the author's intubated cases, yet there was no case of severe decubitus (erosion) in the larynx. Thus secondary tracheotomy can be avoided. If the above numbers are added to those of Bleyer and Baer, it is found that, out of a grand total of 479 intubated cases, the tube remained in longer than 5 days in 19.2 per cent. The author draws the following conclusions: (1) that the time for withdrawing the tube varies within very wide limits, (2) that the average time was 79 hours before and 61 hours after

the introduction of the serum treatment, and (3) that he cannot share the opinion of some writers, who maintain that a secondary tracheotomy must be done if the tube cannot be left within 5 days. No definite, fixed time can be laid down. The unquestioned presence of severe decubitus in the larynx is an undoubted indication for a secondary tracheotomy, but the mere fear of such arising should not be taken as an indication.

Mugues, of Lyons, ²⁰⁴⁵₉₆ published statistics showing that, before the serum treatment was used, intubation had shown a mortality of 66 per cent. in 124 cases of diphtheria; while, since antitoxin had been used, the mortality had been reduced to 27.5 per cent. in 73 cases. All the cases, of course, were severe ones. (See section on intubation.)

Hagen, of Berlin ³⁰¹_{B.39,H.3,4} makes a report of 1929 tracheotomized children, of whom 71 per cent. died, and 1765 not operated on, of whom 26 per cent. died. Simple laryngeal diphtheria gave much better results (52 per cent.) than the descending diphtheria of the pharynx.

Fischer, of Hanover, ³⁰¹_{B.39,H.3,4} reports upon an experience of one thousand cases, and states that the operation with blunt hooks is the best method. After having cut the skin with a bistoury only, the hooks are applied to divide the soft parts. In this manner it is possible to avoid hæmorrhage. Scarcely ever was a ligature necessary. He prefers high tracheotomy. He uses Luer's cannula at first, and during the latter days a cannula with dorsal hole. Of his one thousand cases 41 per cent. were cured. Of cases of diphtheria without tracheotomy, 67 per cent. were cured.

Bors ¹_{June 29, '96} has treated a series of cases of laryngeal obstruction arising in the course of diphtheria and croupous laryngitis by means of forced dilatation. For this purpose he uses an instrument consisting of a three-bladed, jointed, dilating cannula, attached to a bent shaft contained in an introducing handle. After the cannula has been introduced into the larynx the blades are separated by means of a screw situated under the handle. The application occupies but a few moments, and, in the majority of cases, a single dilatation is sufficient. Should the growth of false membrane constantly recur, the manipulation should be undertaken every two or three hours for two or three days. The same procedure may be adopted in cases of laryngeal stenosis due to syphilitic and other cicatrices. The instrument is made in three sizes of 2½, 4, and 5 millimetres in diameter.

[The literature relating to diphtheria has greatly increased during the last year. The interest which has been awakened in reference to this malady has been due not only to its wide preva-

lence and fatal character, but largely to its treatment by hypodermatic injections of immunized serum, which is now on trial wherever there is a medical profession, with, in my opinion, a gradually increasing belief in its efficacy. The greatest benefits conferred on humanity by the medical profession have usually been ridiculed at first. Jenner, when he vaccinated his own children and recommended vaccination to other parents, was violently opposed by physicians and the laity, and caricatured in the leading British medical journal as a hideous monster converting men into beasts. Bouchut, when he recommended intubation in place of tracheotomy, was quickly silenced by the vigorous opposition of Trousseau, and yet, after a generation has passed, O'Dwyer's tubes are used in every important French hospital. In the same manner, the aggregate of good results from the use of antitoxin gives a higher percentage during the last year than formerly; so that the prospect of a general recognition of the efficacy of the antitoxic serum in the near future seems probable. During the investigations relating to the effect of this agent interesting and important facts have been brought to light, as the following: The earlier the serum is injected in the maximum quantity, the better is the result. If the diphtheria has continued a few days, other microbes are likely to occur, over which the immune serum has no control. Cases of mixed infection, when, for instance, the Lœffler bacillus, streptococcus, and staphylococcus co-exist, the latter two, not being influenced by the serum treatment, are more obstinate and likely to be fatal than when the diphtheria alone is present. In hospital wards, where different infectious diseases have been treated, the mixed infection is more common than in private houses; hence the statistics of diphtheria are more accurate if taken in private families, where, as is probable, the Lœffler, or diphtheria, bacillus is not complicated with other germs.—J. L. S.]

J. L. S.

Parotitis (Mumps).

Pathology.—Letzerich³⁹⁷_{Aug. 21, '96} made potato cultures of the blood and of urine of patients suffering from parotitis and kept the cultures at a temperature of 25° to 30° C. (77° to 86° F.). Dry membranes developed, of a dull color and irregular in outline, consisting of colonies of bacilli which he regards as the specific microbe of mumps. This microbe is shorter and wider than the bacillus of influenza, and stains with fuchsin a deep red at the periphery and a light red in the centre. At each pole are two spores which take the same stain as the bacillus. The microbe with its spores

can be seen in the urine of children with parotitis, but in the blood only the spores can be found.

Janowski⁵⁰_{B.17, No. 22, '95}; ⁵_{Oct., '95} reports a case of suppurative parotitis caused by the typhoid bacillus. The right parotid gland was found to be infiltrated with pus, which was in places collected in small abscesses. Cultures from this pus developed only the typhoid bacillus, whose identity was carefully proved by comparison with known cultures of the typhoid bacillus and of the bacillus coli communis. As has been repeatedly observed in connection with suppurative processes due to the bacillus typhosus, the progress of the complication was slow, so that the parotitis became fully developed only after the termination of the primary disease. Those cases of suppurative parotitis occurring in connection with typhoid fever, which have heretofore been examined bacteriologically, have been found to be due to the ordinary pyogenic bacteria, —staphylococcus pyogenes aureus and streptococcus pyogenes,— or to have contained one or the other of these germs in association with the typhoid bacillus. Janowski's is the first case in which the bacillus typhosus has been found alone.

Barjon³⁰⁴_{Oct. 12, '95}; ¹_{Nov. 2} states that many authors deny the occurrence of suppuration in mumps, and all agree in recognizing the extreme rarity of this complication. Barjon cites three cases which occurred during an epidemic of mumps. A bacteriological examination in one of them revealed the existence of small chains of streptococci and especially staphylococci. A tube of bouillon was sown with the pus, which gave a thick, flaky culture in which a large number of micro-organisms of the mouth were found. Barjon states that the specific germ of mumps is not pyogenic. In every case of mumps, if an examination of the pus is made, the ordinary organisms of suppuration will be found. It seems, then, very probable that this is simply a secondary infection independent of the primitive infection, and that the following conclusions may be drawn:

1. There does not exist, properly speaking, suppurative mumps.
2. Suppuration, when it does occur, is always connected with a secondary infection of salivary origin; it is a secondary suppurating parotiditis following a primitive specific parotiditis.
3. Buccal asepsis is sufficient to prevent this complication. For that purpose it is better not to use strong antiseptics, for they may provoke erosions of the mucous membrane and in this way facilitate the infection instead of preventing it. Boric-acid solutions or, better still, very hot water should be employed.

At the French Congress of Internal Medicine, Paul Claisse and Ernest Dupré, of Paris,¹²¹_{Jan., '95} had already stated that clinical and anatomo-pathological observation had permitted them to

establish the buccal origin of parotiditis and the anatomical extension of its lesions.

Interesting in this connection is a paper by E. Albert,⁹² who concludes that efforts at insufflation, such as those required in the use of wind-instruments, like the military trumpet, may cause a relapse of parotitis in persons who have recently suffered from the affection. He notes the frequency with which young musicians are affected, and attributes the fact to the more prolonged and intense efforts incidental to their study. These relapses may end in a chronic lesion of the parotid gland, which becomes hypertrophied, thus causing a sort of chronic mumps.

Hand⁵¹ July, '95; Oct. ⁵ reports a case of mumps in a boy of 22 months, the subsidence of the parotid inflammation being followed by enlargement of the lymphatic glands at the angles of the jaw, by an extremely irregular fever, and by intense anæmia. The pharynx, except for slight catarrh, exhibited no abnormality, and continued so for eleven days longer, when, after an interval of forty-eight hours, between visits, a fluctuating swelling was observed nearly occluding the pharynx. Incision of the abscess was followed by rapid subsidence of symptoms, convalescence being interrupted only for a day by incipient mastoiditis. The case is noteworthy for the slow development of the abscess, since the process in children is rarely prolonged beyond a week. In Hand's case a hectic type of fever was recorded for fully three weeks, and no cause could be assigned until the abscess rather suddenly made its appearance.

Hornus¹²⁰ Jan., '96 publishes the report of a case of fatal peritonitis following orchitis, due to mumps. The vascular and embolic origin of certain cases of parotiditis is regarded as fully demonstrated by Sabrazès and Faguet¹⁰⁰ Sept. 27, '94 in a case of puerperal infection in which an ulcerative endocarditis had caused septic emboli which had invaded the lungs and right parotid gland, the staphylococcus aureus being found post-mortem in the pus of that gland.

An eruption in mumps has not as yet been noted, but Morard¹⁴ June 30, '95 cites two cases in soldiers who presented, in the course of a classical attack, an exanthem resembling measles. The author believes this to have been the result of the elimination by the skin of the toxins secreted by the infectious agent of the disease. According to Beverley Robinson, of New York,⁵⁹ June 8, '95 we do not frequently observe the arresting influence of one contagious and infectious disease on the other. He cites two cases of mumps and measles in which the times of incubations were accurately known.

In the case of the younger child there was evidently no influence of mumps over measles, as the former disease had entirely disappeared. In the second case the development of the mumps was obviously held in check by the measles until the twenty-sixth day after actual exposure and the thirty-second day after possible exposure.

Debout d'Estrées¹¹²_{Mar., '95} reports two cases of gouty parotitis which had come under his observation, the only two with which he had met in a large experience among gouty subjects since 1868, at the watering-place, Contrexéville, France. He had collected a dozen unpublished cases from various French and English authors.

Le Roy¹⁵²_{Nov. 23, '94} describes a case of nephritis complicating mumps and ending fatally. The patient was a girl, 9 years old, who was attacked with benign parotitis, which disappeared in eight days, when she began to go out. The urine had not been examined. A month later the child presented œdema of the face, the lumbar region, and the lower limbs. The urine was scanty (800 grammes— $26\frac{1}{2}$ fluidounces) dark red, cloudy, and contained 3.6 grammes ($55\frac{3}{4}$ grains) of albumin per litre (quart). Careful examination revealed no other cause but the parotitis. In spite of milk diet and a visit to the country the child died from uræmia three months and a half later.

Trouillet⁸⁹⁵_{June, '95} has collected the statistics of 626 cases of mumps in the garrison of Grenoble from 1890 to 1895. Of these, 184 cases were complicated by orchitis,—153 simple and 51 double. There were 4 cases complicated by endopericarditis, 2 by double pneumonia, 10 by multiple arthralgia, and 2 by serious encephalopathy, but there were no deaths. As shown, a death from mumps is very rare. C. G. Slagle, of Minneapolis, Minn.,¹⁰⁵_{Sept. 5, '96} reports one, however, which came under his observation. He found the patient dying from septicæmia or uræmia, her symptoms having all been characteristic and intensely grave.

Pertussis (Whooping-cough).

Etiology and Pathology.—Cohn and Neumann⁴⁰_{Feb., '96} think that the streptococci found in pertussis may be considered as accompanying pertussis, rather than as the direct cause of the disease. These authors examined the sputum of twenty-four children, from 1 to 10 years of age, all being typical cases of whooping-cough, and most being in the beginning of the convulsive stage. The microbes most frequently found were small cocci, generally arranged as diplococci. Various micro-organisms were found in the sputum of these children, but in such inconstant numbers that no

significance can be properly attached to them. These investigators are justly very cautious about drawing any definite conclusions from their experiments.

Weill ³_{Nov. 4, '94} relates an instance in which twenty-nine children suffering from whooping-cough were placed in a ward in a hospital with one hundred and twenty-three others, and not one of the latter took the disease. The minimum time of their stay in the ward was twenty days. All children over 7 years of age were left out of account, also those who remained in bed while in the hospital, leaving only those who were likely to take the disease, but no infection resulted. While no positive conclusion can be reached from these facts, yet the author believes that, if whooping-cough were infectious in the city and not in the hospital, it was because different conditions existed. The most striking feature in this case was that the children who had been received at the hospital were in the last stages of the disease; in the city, on the contrary, contact with the children suffering from pertussis occurs in the beginning, at a time when a diagnosis cannot be made. This fact suggests the advisability of new researches.

Silbermann, of Breslau, ¹⁵⁸_{B. 18, II 1, 2} in a study of lesions of the right heart in pertussis, states that in many cases during the attack we can observe weakened action of the heart and of the pulse, with great frequency of the latter up to one hundred and fifty or diminution to fifty to the minute. Sometimes dilatation can also be detected, and in some cases he has observed dilatation of the right heart. During the whole time of the disease there is weakened pulse, albuminuria, and a systolic murmur of the tricuspid valve. The author relates five cases, four of which recovered. One died in an attack of cough, and the post-mortem examination showed great dilatation of the right heart. The myocardium and orifices and even the valves were anatomically normal; the tricuspid alone was mechanically insufficient by reason of the dilatation of the right ventricle. The paper thus emphasizes anew the necessity of watching the heart during the whole course of pertussis, as pointed out several years ago by Koplik, and of supporting its strength by the early administration of digitalis as soon as signs of venous engorgement become noticeable.

Neurath ⁵⁷_{Nov. 15, '95} showed three cases of cerebral paralysis at the Vienna Medical Club which had arisen directly or indirectly from whooping-cough. The etiology of these cases may be discussed from different points of view. The most prominent of these is emboli. In the first two cases exhibited no heart affection was detected. Strümpell considers the cause of the paralysis arises from an acute form of encephalitis of the cortical portion of the

brain, somewhat analogous to poliomyelitis. From this point of view he would place the sequelæ of pertussis in the same category as influenza, variola, scarlatina, rubeola, and vaccination. Redlich, in confirmation of this opinion, found the interstitial tissue of the gray matter inflamed in poliomyelitis, resembling that found in the gray matter of the spinal cord, the oblongata, and other gray centres of the nervous system.

Teillais, of Nantes, ²¹²_{Aug. 10, '95} notes a rare complication of whooping-cough in a child, 4 years of age,—namely, detachment of the retina. It was impossible to find any other cause than severe pertussis, remarkable for the hæmorrhages which it caused over the entire body.

According to Comby, ¹⁴_{Mar. 10, '95} Roger has called attention to the great mortality (30 per cent.) of whooping-cough in hospitals, while in families it is very small. He treated 1200 cases at the Villette Dispensary, Paris, with a mortality of 1 per cent., though he adds that all the fatal cases may not have come to his knowledge; still, the mortality was much less than in hospitals. He measured his isolation wards at the Trousseau Hospital, and found that each child was allotted 20 cubic metres of air-space,—an amount entirely insufficient. He suggests that it is better not to receive whooping-cough cases into hospitals, but to treat them in dispensaries or private practice.

Johnston ⁵¹_{Apr., '95} has published an analysis of the causes of death in 500 cases of whooping-cough in Washington as assigned in the death-certificates: 203 deaths were attributed to lung diseases (broncho-pneumonia, 128; "congestion of the lungs," 34; bronchitis, 38; atelectasis, 2; hæmorrhage, 1); 146 to cerebral disorders (convulsions, 107; meningitis and cerebritis, 22; "congestion of the brain," 16; apoplexy, 1); 84 to exhaustion, marasmus, and like conditions; 26 to diarrhœa and dysentery; 21 to asphyxia and syncope, and 15 to tuberculosis following whooping-cough.

Treatment.—C. G. Cumston, of Boston, ²³_{Nov., '94} has found that antipyrin is serviceable, though not a specific. H. Rehn, of Frankfort-on-the-Main, ⁴_{Oct. 16, '94} tried a mandelate of antipyrin in sixty cases, in doses of 0.05 to 0.10 gramme ($\frac{3}{4}$ to $1\frac{1}{2}$ grains) for children from 3 to 5 years of age. In all but two cases the paroxysms diminished in number, the appetite improved, and vomiting ceased. The salt is obtained by treating antipyrin with mandelic acid. The author believed that the results were better than when pure antipyrin was used. In this belief, however, Sonnenberger, of Worms, ³⁴_{No. 52, '94} does not concur.

W. C. Hollopeter, of Philadelphia, ⁸⁰_{Oct. 15, '94} calls attention to three very important factors in the treatment of whooping-cough:

1. The early recognition of the disease before the spasmodic stage, suggested by puffiness under the eyes. Then hydrogen peroxide, or possibly cocaine, should be applied locally. In very young children this treatment is sometimes abortive. 2. The use of belladonna, pushed to toxic effects, in the second stage is very valuable. 3. Out-door life, sea-shore the best, if the foregoing are not effective.

Cocaine is lauded by S. Russell Wells and L. J. G. Carré, of London, ⁶June 8, '95 who express the opinion that the catarrhal stage of the disease should be regarded as the period of microbic activity, the whooping stage being due to the after-effect of the toxins. They have treated some three hundred cases of whooping-cough by the internal administration of hydrochlorate of cocaine in doses varying from 0.004 gramme ($\frac{1}{16}$ grain) in infants of 8 months to 0.02 gramme ($\frac{5}{16}$ grain) in children of 5 or 6 years. These doses were given three times in the twenty-four hours. The treatment had a very favorable effect on the symptoms and course of the disease. Vomiting was checked, appetite returned, the attacks of cough diminished both in frequency and in intensity, sleep was less disturbed, and the duration of illness was markedly lessened, the disease being cured, as a rule, in three weeks, sometimes in a fortnight. Cocaine is generally well borne by children. The only disagreeable effect occasionally noted is looseness of the bowels, which, as constipation is a frequent accompaniment of whooping-cough, the authors think an advantage rather than otherwise.

Bromoform has received its share of attention as a remedy in whooping-cough, and among those recommending it may be mentioned P. J. Eaton, of Pittsburgh ⁵⁹May 25, '95; P. Schlieper, ¹¹⁶Dec., '94 and S. G. Burnett. ¹⁰²Sept., '94 All noted a stuporous condition following the administration of the initial dose, which in Burnett's case was 5 drops. This effect passed off, but re-appeared when the dose was increased. Burnett finds that its immediate use, 1 drop for each year of the age, gradually increased, with hot-water drink, commencing with the appearance of the first symptom, will limit the attack to two and a half or three weeks. Medication postponed till the "whoop" appears will not greatly shorten the attack, but will lessen the severity and the number of the paroxysms. Interrupted medication of two days will render the paroxysms less controllable than before the discontinuance and prolong the attacks into the fourth and fifth weeks. Improper or non-systematic medication only aggravates the condition of the child. P. J. Eaton, of Pittsburgh, Pa., ⁹May 25, '95 describes the drug as a sedative, germicide, and antipyretic, and cites illustrative cases of its effects when administered in whooping-cough.

Herbert B. Carpenter, of Philadelphia, ¹¹⁹_{Sept. 14, '96} has used bromoform in a number of cases and usually with marked improvement in the condition of the patient. As bromoform is but slightly soluble in water, it is best to add some alcohol to the solution, giving it in the following manner:—

R Bromoform, 48 drops.
 Rectified spirit, 4 fluidrachms (16 grammes).
 Distilled water, 1 fluidounce (31 grammes).
 Syrup of Tolu, sufficient to make 3 fluidounces (93 grammes).
 M. Sig. : 1 fluidrachm in water every four hours.

Baratiers, of Jeugny, ¹⁶⁴_{Oct. 5, '95} ¹²¹_{Nov., '95} conceived the idea of combating the sometimes alarming accidents of hæmoptysis in whooping-cough by means of inhalations of bromoform. This is a new manner of administering the drug, and, according to the writer, gives excellent results. The inhalations were given in the following manner: About a glassful of the alcoholic solution of bromoform, previously warmed to about 50° C. (122° F.), is poured upon a plate. The child bends over the plate and slowly and regularly inhales, for five or six minutes, the vapors given off from the liquid. It may happen that the first inspirations give rise to an attack of convulsive cough and a more abundant expectoration of blood, but this effect is only momentary, for, by its anæsthetic property, it produces a local obliteration of the blood-vessels. The inhalations were given, on an average, once in every two hours. It is also a good practice to vaporize the same solution in the sick-room of the patient, both on account of the child and the possible contagion to other children. By this means in eight cases there was not one of contagion.

Max Stoss, ¹¹³_{June 23, '95} ⁸¹⁴_{Aug. 1, '95} after extended experience, states that bromoform decidedly decreases the number of paroxysms, and their intensity, in the majority of cases; but whether the total duration of the disease is shortened he is not prepared to say. In children less than 1 year old a slight narcotic effect of the bromoform was noted. The author has, for this latter reason, of late substituted antispasmin (narceine-sodium and sodium salicylate), as used by Demme and others, for bromoform, when treating children of that age.

The action of antispasmin, however, he has not found entirely uniform. Although the duration of the disease was not materially affected, the author is confident that its course was rendered much less severe and the convulsive stage much milder in form. The remedy was well borne, even by children but a few months old. The only secondary effect noticed was a slight inclination toward constipation. The doses given were 0.01 to 0.015 gramme ($\frac{1}{6}$ to

$\frac{1}{4}$ grain), three or four times daily, for children under 1 year; 0.02 gramme ($\frac{1}{8}$ grain) for children up to 3 years old, and 0.04 gramme ($\frac{2}{8}$ grain) to older children. The author prescribed the remedy in 2-per-cent. solutions.

G. Cavaleri⁵⁰⁵_{June 1, '95; Sept. 22} reports that, in 1894, he had more than 200 cases of pertussis under treatment. Almost all therapeutic measures proving useless, it occurred to him to try the effect of vaccination. He vaccinated more than 100 children suffering from whooping-cough, but only in 64 of these did the vaccine take. Of the 64 only 1—a baby of 4 months—died, whereas before the vaccine was used there had been many deaths. The vaccination had a favorable effect on the course of the disease, both diminishing the violence of the paroxysms and shortening the duration of illness, the vaccinated cases recovering in from three to three and one-half weeks, while the unvaccinated cases either died within the same period or took eight or nine weeks to recover.

Theodore Fisher, of Rochester, N. Y.,¹_{May 11, '95} has treated twenty-seven cases of whooping-cough with quinine since June, 1894, and realized "remarkable results." Improvement began at once, rapid progress was made, and the course of the disease was shortened. The drug must be given in fairly large doses,— $\frac{1}{8}$ grain (0.01 gramme) for the month or $1\frac{2}{3}$ grains (0.10 gramme) for the year of the patient, three times a day; but the highest single dose not to exceed 7 grains (0.45 gramme).

Leuriaux⁴⁵⁴_{Oct., '94} treats the disease exclusively by intra-nasal insufflations, three or four times daily, of sulphate of quinine and resorcin in powder, the head being held forward and downward. The insufflation should be practiced immediately after a paroxysm.

Frühwald¹⁵⁸_{B. 18, H. 1, 2, '94} used antispasmin in two hundred cases with good results. The drug was administered in a 5-per-cent. solution. At the age of 6 months 3 to 5 drops were given four times daily; at the age of 1 year, 5 to 8 drops, and at 3 years 15 to 20 drops four times daily.

Ullmann³⁶⁶_{B. 40, H. 1, '95} states that a threatening paroxysm may be arrested sometimes when in the house by carrying the child to an open window, where it takes several deep inspirations, and the feeling of distress and anxiety which precedes the paroxysms passes off. For sake of comparison between the period passed out-of-doors and that passed in the house he has noted, in a series of cases, the hours spent in each, and the number of paroxysms and their intervals under the two conditions. From these data he concludes that the fresh-air treatment is one of the most efficacious, if not the only one, for the management of a case of

whooping-cough. The child should pass the entire day out-of-doors, not only in the warm season, but even at all times of the year, provided it be not stormy. It is considered only necessary to prevent the child from running or talking or otherwise provoking an access of coughing.

De Chateaubourg³¹_{Dec. 26, '94} describes a new treatment of whooping-cough, which consists in injecting, subcutaneously, $2\frac{1}{2}$ cubic centimetres (39 minims) of a 10-per-cent. solution of guaiacol and eucalyptol in sterilized oil. After the third injection the fits of coughing diminish noticeably, the appetite returns, and, as the vomiting rapidly ceases and the general condition begins to feel the good effects of the treatment, the whooping-cough disappears at the same time. The author reports five cases thus treated.

Moncorvo¹¹⁸¹_{No. 1, '96} regards local applications to the larynx of a 1-per-cent. solution of resorcin as the most effective remedy yet employed.

H. M. Haskell,⁹_{May 18, '96} derived little good from the doses of chloral usually recommended in the text-books, and soon realized that the drug must be given often enough to render the paroxysm so mild as to be harmless. A child 1 year old will probably require 10 or 15 grains (0.65 or 1 gramme) in twenty-four hours, and perhaps more.

McKee¹¹⁹_{Sept. 14, '96} recommends the hot poultice, not as it is ordinarily applied, but as suggested by J. Madison Taylor. The poultice is made large enough to cover the posterior surface of the lungs, and on this the child is permitted to lie for one hour without a change. Relief is almost immediate, and invariably the little sufferer becomes quiet and passes into a peaceful slumber. After an hour it is removed and into the relaxed skin is rubbed some stimulating preparation, as sweet oil and camphor, or what is just as effective, among the poorer classes, turpentine and lard in the proportion of 1 to 15. After this a cotton jacket is applied. One application a day ordinarily suffices, but the poultice should be repeated as indicated. Three ends are achieved by this treatment: 1. It secures rest. 2. It reduces temperature. 3. By relieving congestion pain is lessened.

Charles Mantey, of Minerva, Ohio,¹⁸⁶_{May, '96} states that valerianate of zinc has, in his hands, almost proved itself a specific, subduing the spasmodic element in from three to four days. It is very easily given. The dosage ranges from $\frac{1}{48}$ grain (0.00135 gramme) for infants under 2 months to $\frac{1}{4}$ grain (0.0045 gramme) at 1 year, $\frac{1}{6}$ grain (0.01 gramme) at 2 years, increasing, at the rate of $\frac{1}{24}$ grain (0.0027 gramme) per year, until, at 10 years, the dose is $\frac{1}{2}$ grain (0.03 gramme). The dose should be given three

times a day, two hours after meals. It must be well rubbed up with sugar of milk.

Scarlet Fever.

Etiology and Pathology.—Bergé, of Paris, ³¹_{Nov. 13, '96} considers it as illogical to insist upon the necessity of a specific organism to explain the pathogenesis of this affection when all the lesions observed are those entering within the field of the streptococcus. In ordinary scarlatina the streptococcus is cultivated in the tonsillar crypts and there, most probably, secretes an erythemagenic toxin, which causes the eruption of the skin and mucous membrane. Hutinel and Mussy have already indicated the rôle of the streptococcus in the production of certain forms of scarlatinoid erythema, and Walter Dowron, in 1893, has expressed the opinion that the throat and tonsils might well be the starting-point for scarlatina. In puerperal scarlatina, while a bucco-pharyngeal erythema usually exists, it is, curiously enough, noticeable that tonsillitis is absent. This is, moreover, the only peculiarity distinguishing it from ordinary scarlatina, and it may be added that women attacked by puerperal scarlatina have almost always been previously exempt from scarlatina. The convalescence, articular and renal complications, etc., are the same. The genital complications alone are proper to puerperal scarlatina. It is precisely these genital lesions and their streptococcic infection which form the starting-point in the puerperal scarlatinal eruption; they thus take the place as a local cause of the disease, of the tonsillitis, which is the source of the erythema in ordinary scarlatina. These two forms of scarlatina constitute one and the same disease; besides the identity of their symptoms, complications, and general course, they are almost always co-existent during the same epidemic, while puerperal scarlatina without angina often precedes, accompanies, or follows scarlatina with angina. In the author's opinion the streptococcus is undoubtedly the agent of puerperal utero-vaginal scarlatina; he found it in the lochia of two lying-in patients attacked by scarlatina, but was unable to discover it in the lochia of a lying-in patient having tonsillar scarlatina. These facts—in addition to the knowledge of infectious forms of erythema without characteristics of scarlatina occurring during puerperal infection, and to that of septicæmic and pyæmic manifestations of puerperal scarlatina, as well as of the demonstrations of Widál, who emphatically attributes puerperal scarlatiniform erythema to the streptococcus—authorize the opinion that this microbe is not only the pathogenic organism of utero-vaginal scarlatina, but also that of tonsillar scarlatina.

E. F. Kemper¹²¹_{Dec., '95} has never found the Klebs-Löffler bacillus in the pseudomembranous angina of scarlatina. On the contrary, the streptococcus is present in the tonsillar crypts from the beginning of the malady, sometimes even as a pure culture. It persists in that situation after disappearance of all the inflammatory manifestations. If the rash is intense the streptococcus is also found in the vesicles of the miliary eruption. If the disease is of rapid development and early prove fatal without any local lesions, the micro-organism is perceived in the blood as a pure culture. The disease in such cases develops as a streptococcic septicæmia.

After a bacteriological study of one hundred and seventeen cases of scarlatiniform angina G. H. Lemoine¹⁴_{Dec. 22, '95} concludes that, while pharyngeal phenomena occurring in scarlatina occupy the first rank among the symptomatic manifestations of this affection, owing to their constant presence and sometimes also to their severity, the streptococcus is the only organism which is always present in scarlatiniform angina. While in a certain number of cases the streptococcus presented the characteristics assigned to it by Bourges and Wurtz, d'Espine, and de Marignac, in others it appeared to be absolutely similar to that of erysipelas. The author finally concludes that the streptococcic origin of the angina of scarlatina does not appear to be peculiar to this affection. In this respect the pharyngeal conditions in scarlatina appear to be of the same nature as in a number of other forms of angina.

Espine,¹¹⁸_{Dec., '95} in examining, as early as possible in the course of the disease, four uncomplicated cases of scarlatina, only once found the streptococcus in the blood; on the other hand, he was twice able to isolate in the tonsils a streptococcus which presented the characteristics of that of scarlatina. These characteristics are as follow: It rapidly coagulates milk, with formation of whey, surrounding a compact central clot (this property may be lost at the end of from two months to two years). The cocci are smaller than those of the ordinary streptococcus, they are rounded in form, while the ordinary variety is habitually lenticular in shape. Other less constant and less certain characteristics are also given. The virulence is also very variable. This microbe appears to be peculiar to scarlatina, if the fact be borne in mind that it appears in the blood at the beginning of the eruption and without complication. The ordinary pyogenic streptococcus may, however, also penetrate in turn, through the presence of angina, and may provoke a general infection.

Czajkowski⁵⁰_{Aug. 8, '95} states that blood from scarlatinal patients shows micro-organisms in the form of diplococci. They are found

in relatively small numbers,—one to two in a field of vision,—generally occur singly, though sometimes in twos or short chains. They are never seen in the blood-corpuscles. The shape of the organism is oval, though with ordinary magnification no difference between the diameters can be observed. They do not stain by ordinary methods and decolorize readily when stained by Gram's method. The specimen from fresh blood has a surrounding capsule which is absent in the dried form. The growth of the organisms on culture-media was carefully studied. Upon the solid culture-media it is very slow. Upon all the solid media the colonies appear under the microscope as minute dew-drop-like points measuring one-half by one-half millimetre, and not becoming confluent for months. The organisms continue vital upon the solid media for three to four months, if protected from drying. In the liquid culture-media, especially in bouillon, the organisms form a yellowish-white, finely-granular, light precipitate at the bottom of the glass. The inoculation of the organisms beneath the skin and into the blood of rabbits was without result. Inoculated mice died in three days with the cocci distributed through the blood.

Referring to the relations existing between scarlatina in childhood and pregnancy in after-life, Delbreil ²¹²_{Oct. 25, '95} publishes several cases demonstrating that, in a large number of cases, the albuminuria of pregnancy and the conditions which it induces are dependent upon a latent renal alteration following scarlet fever. The nephritis of scarlet fever, it is true, is nearly always curable. The author considers it advisable to call the attention of physicians to the necessity of inquiring into the pathological antecedents of the women they are to attend in confinement. Whenever there is a history of infectious diseases, and particularly of scarlet fever, which has a marked predilection for the kidney, they may, by prescribing a special diet, avoid serious accidents at the time of confinement, and prevent the too rapid progress of the nephritis, even during pregnancy.

Alfred Lid ⁹⁹⁶_{Nov. 10, '94} concludes that the albuminuria of scarlatina, a manifestation of multiple and variable lesions, is either transitory or permanent, that scarlatina exercises not only an immediate action on the kidneys, but also a remote action, and that the remote renal manifestations of scarlatina correspond to several types governed by the degree of the anatomical alteration of the kidneys.

Kahlden ⁷⁶⁸_{B. 16, p. 602} calls attention to a special form of scarlatinal glomerulo-nephritis, the most characteristic alteration of which is a repletion of the capillary loops of the glomerule by a filamentous and partially granular mass, which may be stained a

grayish blue by hæmatoxylin and red by eosin. An intra-vascular formation of fibrin, differing from that observed by Friedländer, inasmuch as it is not limited to the glomerule, but is also met with in the afferent and efferent vessels, and often even in the right arteriole. Very frequently the coagulation occupies the right arteriole and several of the corresponding glomerules.

Re-infection.—Theodor Hase, of St. Petersburg, ³⁶⁶ ⁵ _{B. 39, H. 1; June, '95} has studied a series of 2453 cases of scarlatina with special reference to the occurrence of re-infection. Among the total number of cases studied this occurred in 17. Age seemed to play no part, the cases being observed in children from 1 to 9 years old. The primary disease was, in most cases, light or moderately severe; in 3 only was it severe. The onset of the re-infection was marked by no special complication beyond the rise of temperature, except in 3 cases: (1) in a child of 1 year and 2 months, catarrhal pneumonia; (2) acute enteritis in a child 1½ years old, and (3) in a child 3 years old, who had had an intercurrent attack of measles, the scarlatinal re-infection proved fatal. The primary eruption in 12 cases was moderately marked and in 5 intense. The secondary exanthem was always less intense than the primary, lasted two to eight days (more frequently two days only), and subsided more rapidly than the first. The elevation of temperature was sometimes higher, sometimes lower, than in the primary attack. Renal disease occurred in 8 of the cases. The so-called pseudore-infection usually occurred at the end of the first or middle of the second week; the true re-infection much later,—in the third to the sixth week. In none of the cases did vomiting mark the onset of the re-infection.

John B. Crandall, of Sterling, Ill., ¹⁹ _{Jan. 26, '95} records an unusual case in which scarlet fever appeared twice during the same year. In March, 1894, he treated a girl, aged 12 years, for an attack which followed the ordinary course, with exfoliation of the derma. The convalescence and recovery were without complications. The rest of the family were isolated and escaped. In November he was called to attend her again, and watched the case from the early fever to the formation of the scarlet rash, the symptoms—strawberry tongue, exfoliation, etc.—being marked, though the throat-symptoms were not so prominent as in the first attack.

Sequeira ² _{Nov. 16, '95} reported the case of a boy, 5 years old, who suffered from two attacks of scarlatina in rapid succession. In the first the rash was well marked, the temperature high, and the tonsils swollen and injected. The disease pursued a moderately severe course, and desquamation began about the ninth or tenth day and continued until the eighth week. Two weeks later, re-

covery having apparently taken place, the patient, while out-of-doors, was overtaken in a shower of rain, and during the night complained of sore throat and vomited twice. On the next morning the tonsils were congested and much enlarged; the temperature was 104° F. (40° C.), and a punctate scarlet rash appeared on the chest and back and soon spread over the whole body. The second attack was rather more severe than the first. Desquamation commenced about the end of the first and lasted until about the end of the eighth week.

A very thorough examination of the conditions under which these so-called "return cases" may arise has been made by Chalmers, in Glasgow. ^{June 22, '95} From the three fever hospitals of that city, during the year 1894, patients to the number of 2593 were sent to their homes after an attack of scarlet fever, and re-infection thereupon ensued in seventy of the houses to which these patients returned, or in 2.6 per cent. In 93 per cent. of these cases the secondary illness appeared within fourteen days of the return. In 19 per cent. the cause of the secondary illness seemed to lie in the re-appearance of desquamation or in the recurrence of discharge from nose or ear in the original patient after leaving hospital. In the remainder no such cause was found, and it consequently appears probable that the patient may still remain infective, although he is entirely free from desquamation and shows no trace of any post-scarlatinal condition. As regards this hidden infectivity, there appears to be some evidence of its connection with the amount of air-space allotted to each patient during his stay in hospital, and there appears to be a tendency to the appearance of secondary infection when the returning patient, who is the apparent cause of that infection, has been treated in a ward in which there is some degree of overcrowding. In whatever part of the body this infective power may dwell, whether in the breath or in the skin, the important practical conclusion is drawn that isolation of a patient from children should be strictly maintained, as far as possible, for some time after his return from the hospital. In 93 per cent. of those return cases there was community of life either in sleeping, while at meals, or at play.

Concomitant Disorders.—A. A. Himowich, of New York, ⁵⁹_{Sept. 7, '95} presents some cases which tend to show that eruptive fevers may be co-existent, not only varicella and scarlet fever, but also measles and scarlatina. This co-existence is probably of greater frequency than is generally supposed, but the symptoms of one fever mask the other; so that it is rarely recognized and very often not even suspected. That one attack of scarlatina does not always immunize the individual from another attack of the same disease, and

that they may follow each other in rapid succession, undisturbed by other pathological changes in the same system, is clearly shown in a case reported by the author.

As an example of instances of scarlatina and measles occurring simultaneously, the following case, observed by James Ferguson, of Perth, ²_{Oct. 20, '94} may be mentioned: A boy of 9 had complained of sore throat on June 29th; next day a scarlatinal rash was undoubted. By July 6th desquamation was distinct on the neck, breast, abdomen, and thighs. On the 9th he had severe coryza and a constant irritating cough. On the 10th he was covered with a most intense eruption of measles. Desquamation, as if accelerated by the second skin attack, proceeded with unusual rapidity. The author was not able to trace the source of infection, but it is noteworthy that the two poisons must have found a lodgment in the child at much the same time. The boy made an excellent recovery. Similar cases are recorded by J. Johnston, ²_{Nov. 24, '94} of Bolton; G. A. Himmelsbach, of Buffalo ⁹_{Jan. 19, '95}; H. C. Gordinier, of Troy, ⁹_{Feb. 2, '95} and Jas. B. Herrick, of Chicago. ⁹_{Apr. 8, '95}

Rondot ³_{Aug. 17, '95} reported the cases of two patients lying side by side at the hospital, of whom the one, suffering from scarlatina with diphtheroid angina, had contaminated the other, who then presented the symptoms of erythematous scarlatiniform angina, without any rash. The bacteriological examination, however, showed the existence of pharyngeal diphtheria. The author insists upon the necessity of such an examination for establishing the diagnosis of anginas in general, and upon the fact that the initial angina of scarlet fever, whether there be exudation or not, may be determined by the bacillus of diphtheria.

Alluding to cases complicated with variola, A. Resser ⁵³⁰_{V. 44, No. 15, '95} states that he saw a child, 6 years old, not vaccinated, who was admitted to the hospital on the third day of a well characterized scarlatina, and in whom, during the period of desquamation and complete apyrexia, an eruption of variola occurred, preceded by a febrile stage during which the temperature rose to 39.8° C. (103.6° F.). The period of suppuration began on the fifth day after the appearance of the variolar eruption, that of desiccation four days later, and lasted ten days, being accompanied by fever of an irregular type. The little patient recovered. The absence of scarlatiniform nephritic symptoms during the period in which they are usually met with, corresponding in this case with the varioloid invasion, is emphasized. Was this fact merely accidental or due to the influence exerted by the variola upon the scarlatiniform process? A similar case of scarlatina and simultaneously evolved variola is reported by L. Wolberg. ¹⁵⁸_{B. 18, H. 1, 2, '94}

Complications.—Aubrey D. P. Hodges, of London, ⁶Nov. 17, '94 states that in 3026 cases of scarlet fever at the Southeastern Fever Hospital rheumatism was recorded as a complication in 117, or 3.88 per cent. In collecting these cases, and in observing a majority of them, that which has seemed most striking has been the close resemblance to ordinary rheumatism and the probability that scarlet fever stands in relation to this disease as a very strongly predisposing cause.

As to the existence of this intimate clinical resemblance most authorities are agreed, and it seems likely enough that if we were able to take into account all gradations of cases and the life-history in each form, the analogy would be found to merge into an identity, more or less modified by the special conditions under which each occurs. In other words, the large majority of the cases of arthritis which are seen in scarlet fever would be found to be actually due to acute rheumatism.

In a paper on the suppurative joint-lesions of scarlet fever, G. Bellingham Smith and Mary D. Sturge, of London, ⁶Nov. 16, '95 after describing a number of cases, state that the majority were associated with some inflammatory condition of the pharyngeal and cervical structures. In some cases the faucial trouble was the most marked and was evidently the source of infection. In several fatal cases thrombosis of the internal jugular vein was found. In one there was diffuse purulent infiltration of the neck, with thrombosis of the internal and external jugular veins for a distance of two inches at the base of the neck. The author quotes a case described by Heubner in which suppuration at the back of the right tonsil started a cellulitis of the neck which extended to the internal jugular vein, setting up septic phlebitis and thrombosis. In one of their cases the joint affection followed pneumonia and empyema, and they allude to two cases in which Schüller had found pneumococci in the pus from the joint and in which there had been antecedent pneumonia. Another method of infection is, according to them, by the extension of inflammation to a joint from a periarticular abscess. They have seen one case in which distension of the knee-joint with a slightly turbid fluid followed the formation of an abscess just above the suprapatellar pouch. The child died before the fluid in the knee became purulent. Kennedy mentions epiphysitis as occurring at Dublin frequently in an epidemic from 1834 to 1842. In none of their cases were they able to make out that epiphysitis was the cause of the joint suppuration. They compare this fact with the statement of Neve that epiphysitis is common in the joint affections of small-pox. In one case of acute arthritis of the hip-joint following measles

they had seen the head of the femur lying loose in a large intra-articular abscess.

E. W. Goodall²_{Nov. 10, '94} records a series of instances in which the soft palate was perforated in the course of scarlet fever, the most marked case being that of a girl of 6 years, with superficial ulceration of the soft palate and uvula; both tonsils had sloughed. The perforation was through the left anterior pillar of the fauces. He had observed fourteen such cases; in all it was the anterior pillar that was perforated; the perforation took place from the ninth to the twenty-eighth day. He had witnessed similar perforation in diphtheria, but he agreed with Fowler that perforation of the palate was almost diagnostic of scarlet fever. The perforations might be single or multiple.

A case of pulmonary gangrene in scarlatina has been reported by H. Richardière¹⁷_{Jan. 26, '95} in a child 8 years of age. The complication developed during the subsidence of the scarlatina with no premonitory symptoms, and in the absence of any unusual gravity of the throat trouble or general symptoms which might have given warning of its approach. At the autopsy fetid pus and pyogenic false membranes were found in the left pleura. The false membranes covered the lung and concealed the size of the perforation. In the upper lobe there was an isolated area of sphacelus the size of a hen's egg.

Symptomatology.—A. D. Blackader, of Montreal, Can.,⁴³_{Oct. 20, '95} emphasizes the very much overlooked fact that the mere presence of a scarlatinal rash, going on to desquamation and associated with pyrexia, does not of itself warrant the diagnosis of scarlet fever, not even though it should present a certain amount of superficial tonsillitis. Cases will occasionally arise in which, with our present knowledge, an absolute diagnosis is impossible until some days have elapsed. The most important of the scarlatini-form rashes, because the most frequently met with and the most liable to be mistaken, are those cases of rubella, or rôtheln, which present a scarlatinal rash. In general, the exanthem of rubella more closely resembles measles than scarlet fever, but every now and then, more frequently in some epidemics than in others, cases arise when it is impossible to give an immediate absolute diagnosis. The rash on the first appearance may show no characteristic difference; pyrexia may be present and a varying amount of tonsillar congestion. In such cases the all-important factor for correct diagnosis is time, and the following considerations will influence us: Even in mild cases of scarlatina we find a more decided disturbance of the nervous system than in cases with a similar amount of pyrexia in rubella. Drowsiness or marked irritability of the

nervous centres generally precedes the appearance of the exanthem in the former disease, hardly ever in the latter. In rubella the rash, especially after the second day, and on the lower extremities, shows a distinctly patchy condition, with well-defined and slightly-raised margins, or sometimes assumes an almost morbilliform appearance, which is never the case in scarlatina. In scarlatina the pharyngeal congestion is always more or less present, and always bears a fairly definite relation to the amount of rash. In rubella the exanthem may be well marked, while the congestion of throat may be slight and limited to the tonsils. The post-cervical glands are almost always enlarged early in an attack of rubella; if enlarged at all in scarlatina, it is only toward the close of the first week. In scarlet fever, even in mild cases, toward the end of the first week we have a distinct loss of epithelium on the dorsum of the tongue, giving rise to the well-known term "strawberry tongue." This, of course, is much more manifest in some cases than in others, but it is never noticed in rubella.

Starr⁵¹_{Sept., '96} has reported some anomalous cases which show that some of the most constant symptoms of scarlet fever may be wholly lacking, not only during the first days, but through the whole course of the disease.

Rocaz²⁵_{Oct., '94}; ²_{Dec. 1, '94} records the case of a child, aged 1 year, who was brought to hospital suffering from a rash resembling that of scarlatina, and pharyngitis and tonsillitis. A fortnight after the commencement of the illness both the elbows were found swollen, red, hot, and painful. After a week distinct fluctuation was obtained on both sides in the neighborhood of the olecranon. Incisions were made, giving exit to pus which contained streptococci in large numbers. The abscesses did not communicate with the joints. From the time of the operation the patient made a rapid recovery. Rocaz expresses the opinion that the rash was due not to scarlet fever, but to septicæmia, and that the whole illness, including the affection in the neighborhood of the joints, was due to the infection by streptococci, the primary lesion being the angina, which afforded a point of entrance for the streptococci.

Referring to the diagnostic value of vomiting at the beginning of scarlatina, A. Valli³_{Nov. 20, '96} says that it constitutes an excellent diagnostic symptom, enabling one to recognize the disease at a very early period, as well as in cases in which it presents an abnormal type unaccompanied by the pathognomonic cutaneous eruption. The vomiting of scarlatina has the peculiarity of occurring very suddenly, without any apparent cause.

Theodore McGrau¹⁸⁵_{No. 4, '96}; ⁵¹_{Sept.} reports an interesting case of sur-

gical scarlet fever. A boy of 15 was seized, on February 15th, with symptoms of appendicitis and was operated upon on the 19th. The operation was successful, and no septic symptoms appeared throughout. On the 23d scarlatina made its appearance, from which he died on March 1st. The autopsy showed that death did not occur from septic poisoning or from any abdominal complication. The value of this history is in the demonstrated fact that the case did not originate in septicæmia or pyæmia. Putting aside those cases of septic eruptions in which the evanescent and partial character of the rash and the absence of other symptoms make the diagnosis easy, the author doubts whether the so-called surgical scarlet fevers ever differ in nature from those termed idiopathic. He is fully in accord with Sir James Paget, who insists upon the specific contagion in these cases, notwithstanding the fact that the somewhat disorderly appearance of the symptoms in surgical cases has led to the belief that they are not genuine scarlatina. A grave responsibility rests upon the surgeon in these cases. A mistake in diagnosis, or a belief in the non-contagious character of the disease, will tend to spread it broadcast in the family and in the community.

From a review of the literature, Rosa Engelmann, of Chicago, concludes ⁶¹_{Mar. 9, '96} that scarlet fever is associated with a streptococcic infection, admitted to be the cause of surgical scarlatina, puerperal fever, and erysipelas, and suggesting a probable identity.

Treatment.—A. Josias, of Paris, ¹⁶⁴_{Sept. 25, '96} tried Marmorek's anti-streptococcic serum in scarlatina. Although the pathogenic agent of scarlatina is as yet unknown, it is undeniable that the streptococcus is met with in all cases, whether simple or complicated. This microbe, the author has also observed, is found at the beginning of the disease, either in the false membranes lining the throat or in the buccal mucus; in complications of the affection it is found either in the abscesses or in the serous cavities. Josias considers it rational to endeavor to prevent secondary infections and toxic accidents, so frequent in scarlatina, by injecting a small quantity of the antistreptococcic serum. The serum employed had been obtained from sheep. Before injecting it into the children, the author and his colleague, Nocard, inoculated themselves with a dose of 20 cubic centimetres (5 drachms). This inoculation was followed after several days by a temporary eruption of urticaria. By injecting into each of the children suffering from scarlatina a minimum dose of 5 cubic centimetres (75 minims) of the anti-streptococcic serum, the author hoped to immunize them from all the complications of the disease. The injections were made in the right iliac region with all antiseptic precautions. There were

no local accidents. The injection, which is not painful, is well supported. The only untoward effect noted was an eruption of urticaria, localized in the region of the injection. It sometimes becomes generalized and lasts from several hours to two days. None of the patients injected succumbed, but the author adds that he in no way modified the course of the disease, nor prevented the symptoms in the submaxillary ganglia or in the kidneys. In a word, the injections of antistreptococcic serum were productive of no injurious effects, but did not appear to have immunized the patients against the complications proper to the disease itself. The question now presents itself, whether, in operating with serum obtained from the horse, and injected in larger doses, better results would not be obtained.

Joseph Priestley, of Leicester, ⁶_{Apr. 6, '96} reports the results of observations made in 120 cases of scarlatina treated with oil of eucalyptus. Careful rubbings all over the body were practiced three times a day for three days, followed by one rubbing after a warm bath. The disinfectant was also sprayed into the patient's throat, mouth, and nose, and diffused into the air of the room. Sequelæ and complications were treated with the usual remedies. As compared with 161 cases treated with other measures, the mortality in the 120 treated with eucalyptus was as 1.6 per cent. to 4.3 per cent.; the stay in the hospital of non-fatal cases was as 34.4 per cent. to 42.7 per cent.; that of fatal cases 8.5 per cent. to 13.4 per cent.; the time between the commencement of treatment and the return of normal temperature, as 11.4 per cent. to 10.3 per cent.; the percentage of complications and sequelæ, as 20 to 27.3; the percentage of return cases as 3.9 to 5. These results confirm the statements of the original advocate of the method, J. Brendon Curgenvén, of Teddington, who adds ⁶_{Apr. 13, '96} that Priestley's figures show that albuminuria rarely occurred (his cases were as 1 to 10 of those treated in the ordinary way); that desquamation was hastened (his cases were discharged from hospital a week earlier than the others); that there were few or no deaths (his deaths were 1.6 per cent. to 4.3 per cent. in those under other treatment).

Quioc ³_{Feb. 20, '96} refers to some cases of scarlet fever which he had treated with gargles of a solution of carbolic acid, together with the internal administration of salol in doses of from 0.50 to 2 grammes (7½ to 30 grains) daily, according to the age of the patient. The salol was given under the impression that it would prevent any consecutive nephritis. All the patients so treated recovered without any complications. No albuminuria developed at the period of desquamation. A strictly milk diet was enforced in all the cases during the illness.

In an article in which he reports a case of concurrent scarlet and enteric fever, E. Allen MacKeney, of Melbourne, Vic., ⁴⁵¹_{May, '95} calls attention to the fact that albuminuria disappeared when the hæmorrhage occurred. This suggests, he thinks, that venesection performed at the right time might relieve the nephritis, prevent the excessive loss of blood from the bowel, and shorten the course of the disease.

G. Bellingham Smith and Mary D. Sturge, of London, ⁶_{Nov. 16, '95} speaking of the suppurative joint-lesions of scarlatina, lay stress on the advantage to be gained by prolonged immersion of the joint in a warm boric bath, in addition to early and prompt surgical treatment consisting of free incision and drainage. During any intervals between the baths hot boric fomentations are preferable to dry dressings. Nasal feeding is, in some cases, essential in order to combat the exhaustion of the patient, and may often be used as an easy way of giving extra food in cases where the patient is exhausted with the effort of taking nourishment by the mouth.

Measles.

Etiology and Pathology.—Robert S. Adams, of New York, ⁵⁹_{Sept. 20, '94} found the Klebs-Löffler bacilli in ten out of twenty-eight cases of measles throats. Apparently, however, they gave rise to no clinical manifestations of diphtheria at a time when they should have found it easiest,—*i.e.*, in inflamed measles throats. The bacilli were removed with much greater difficulty from half of the measles throats, these organisms apparently finding the inflamed mucous membrane a good habitat. As all of these cases were promptly isolated and treated as soon as bacilli were found, no idea of the virulence of the bacilli could be obtained other than from the few cultures inoculated in animals. All of the children were under observation for three months, and none of them, save one case requiring intubation, showed any sequelæ or further manifestations of diphtheria.

Unna ⁶⁷³_{Oct., '95} described an interesting case in which a varioliform eruption developed in a child, 1 year old, while recovering from an attack of measles. The etiological factor was ascertained to be the streptococcus. In the most recent vesicles the micro-organism was found only in the blood-capillaries, especially in those of the papillary body. An extensive fan-shaped softening had already occurred, with necrosis of the cutaneous surface as in variola, the centre of the lesion being a thrombus with cocci. In a more advanced stage the streptococci were found to have penetrated into the lymph-spaces of the papillary body and the cavity of the

epidermic lesion, especially invading the periphery. In a third stage the entire cavity was filled with the micro-organisms, which diminished progressively in number toward the skin. From the progress of the bacterial invasion Unna concludes that an eruption having the same structure as the pustules of variola may occur without the involvement of the epidermis, but simply through the presence of the bacteria in the capillaries of the papillary body; and, further, that thrombosis of the vessels of the skin may occur without hæmorrhage. The microbes of purpura must therefore secrete toxins having a special action on the endothelial walls of the capillaries. The case also shows that organisms of rapid growth may lodge in the skin and fill the periglandular capillaries without being eliminated by the sweat as has been claimed.

Mensi¹¹⁸_{Dec., '96} states that cutaneous gangrene precedes or follows an ulcerative process, a pustule of impetigo. It principally occurs in the cachectic forms of measles, is usually seen after the disappearance of the eruption, but sometimes during the exanthem. The author reports three cases located in the groin, the external genital organs in a little girl, and the neck, respectively. The bacteriological researches form the most interesting portion of this article. The author found, at the edges of the gangrenous layers and in the deeper portions, (1) the staphylococcus aureus, which is pyogenic in the rabbit; (2) a bacillus resembling the proteus vulgaris, the injection of which into the same animal produced no effect; (3) a bacillus resembling that of Loeffler. Upon injecting a rabbit with a culture of the staphylococcus aureus, a reddish œdema was produced, and, after forty-eight hours, rapidly progressive ulceration. The pseudodiphtheria bacillus produced no ulceration in any of the animals.

J. B. Marvin, of Louisville, Ky.,⁵¹_{Aug., '96} saw at the Baptist Orphans' Home, within two months, eighty-one cases of measles, many of which were characterized by severe stomatitis. The whole buccal cavity was involved, as were also the lips, and there was great salivation. One child had spots of gangrene on the scrotum and prepuce and about the nates, although the attack of measles was a mild one.

Referring to this class of buccal manifestation in measles, Comby¹⁴_{Nov. 24, '95} stated that, when the mouths of children suffering from measles are carefully examined, there will be seen (1) a general swelling, not very great, of the mucous membrane, gums, cheeks, tongue, and palate; (2) a reddish-violet color of all these parts, with or without excessive salivation. A pultaceous exudation, which is creamy and opaline in appearance, partially and unevenly covers these parts. It often forms itself about the teeth, and can

be removed without causing the mucous membrane, which remains intact, to bleed. It may, therefore, be said that measles gives rise to a mild pultaceo-erythematous stomatitis. This enanthem may precede the exanthem. It always accompanies it, disappears with it, is insidious and latent, and serves as a means of diagnosis in doubtful cases (measles or rubeola).

Desbonnets ²²⁰_{Sept. 21, '95} reports a case of ulcerative stomatitis following measles which gave rise to a series of infectious troubles,—namely, fetid diarrhœa, double broncho-pneumonia, suppurative osteomyelia of the two first phalanges of the left medius, and suppurative arthritis of the left scapulo-humeral articulation. Recovery followed.

R. Meslay and J. Jolly ¹¹⁸_{Aug., '95} give an account of four cases of measles complicated with muco-sanguineous diarrhœa. The children were in the same ward of the hospital and were almost simultaneously attacked. They all died after presenting symptoms of broncho-pneumonia. At the autopsy, besides the pulmonary lesions which appeared to be the immediate cause of death, there were found ulcerations of the sigmoid flexure and of the rectum absolutely analogous to those of true dysentery, but with small follicular ulcerations extending upward into the small intestine. In conclusion, the authors state that during measles inflammatory lesions of the intestines, which predominate upon the lower portions of the large intestine, may give rise to numerous ulcerations, very close to one another, which, to the naked eye and even upon microscopical examination, appear exactly like those of true dysentery.

A case in which erysipelas co-existed with measles is reported by Janovski. ⁵³⁰_{V. 44, No. 15, '95} The child was attacked by erysipelas on the same day that his brother showed the characteristic eruption of measles. The erysipelas lasted in all ten or eleven days, including a period of three days during which it had receded only to appear a second time, when a generalized, characteristic, morbilliform eruption also presented itself. The measles developed with unusual rapidity and the erysipelas stopped suddenly; the prodromic period lasted only thirty-six hours, and desquamation occurred three days after the beginning of the eruption.

Symptomatology.—A precocious sign of measles is cited by Bolignini, ¹¹⁴²_{Apr., '95} who states that, at the very beginning of the affection, even before the eruption occurs, a symptom, which appears almost invariably, may be noticed. When the subject is placed in the dorsal decubitus, with the lower limbs flexed, and abdominal palpation is practiced, peritoneal friction is noticeable in certain limited regions. The phenomenon is localized in certain

portions of the abdomen, and when it has once been noticed it can immediately be found again. This would suggest the possibility of a veritable exanthem upon the peritoneal serosa. With regard to this hypothesis, it will be necessary to await further accounts verifying the value of this symptom. A fact which casts some doubt upon its significance is the existence of the friction-sound in three children who had no eruption, but whose cases were considered by the author, from other symptoms observed, as measles without any eruption,—a diagnosis which it would be difficult to establish with certainty.

Treatment.—Lomikovsky, of Karkoff, ³¹_{Feb. 27, '96} witnessed an epidemic of measles in a young girls' seminary, and states that in 16 per cent. of the cases acute lobar pneumonia was met with, which generally appeared after the fever had abated and the exanthem and inflammation of the mucous membrane had ceased. In all his cases the author successfully employed digitalis in large doses, considering the age of the patients, who were from 10 to 12 years old. This agent was prescribed as follows: Digitalis-leaves, from 0.60 to 1.30 grammes (9 to 20 grains), to make an infusion with distilled water, 200 grammes (6½ fluidounces). A tablespoonful is given every hour or every two hours. In no case did this exert a depressing effect upon the heart. When the frequency of the pulse did not diminish, after a relatively prolonged use of digitalis, a small quantity of camphor, in doses of from 0.02 to 0.05 gramme ($\frac{1}{8}$ to $\frac{7}{8}$ grain), was given three or four times a day.

In discussing the case of the nose and throat in exanthematous affections, C. C. Rice, of New York, ¹_{Feb. 10, '96} states that, in treating the anterior nasal passages for the coryza of measles, as little force as possible should be used, and strong preparations, including peroxide of hydrogen and carbolic acid, should be avoided. The preparations used might be combined with oils, with antiseptics, or with bland and unirritating powders, or even with chloroform and cocaine. If an exudate formed in the throat, a strong preparation, mitigated with cocaine, should be used to remove it, and a protective of a suitable oily substance applied afterward. If hæmorrhages of the nose occurred, peroxide of hydrogen would be found a useful astringent.

Wells, ¹¹⁹_{July 13, '96} in cases occurring in infants in which the disease is followed by troublesome pulmonary symptoms and severe inflammation of the eyes, found the fluid extract of eucalyptus, in 5-drop doses, to give relief from distressing cough. For the eyes, solution of mercuric chloride (1 to 12,000) was used, a drop or two being instilled twice daily and followed by a washing with solution of borax in warm water.

Hutinel, of Paris, ³¹_{Jan. 26, '95} has succeeded in almost stamping out broncho-pneumonia among his little patients at the Enfants Assistés affected with measles. The practical extinction of this formidable complication is due to the following precautions: Every child is given sublimate baths; every sore, abscess, or crust of impetigo is carefully dressed; the nose and fauces are irrigated several times daily with boric solution or boiled water, and, finally, every child affected with broncho-pneumonia is promptly isolated.

Varicella (Chicken-pox).

Pathology.—Semtschenko ¹¹⁸_{Dec., '95} has made a study of twelve epidemics of varicella. The large number of cases observed by the author—872—makes his paper particularly interesting. The twelve epidemics in question occurred during a period of fifteen years in a children's hospital in Kazan, Russia. In all the cases there was a period of incubation, which lasted, in 5 children, 3 days; in 7, 8 days; in 26, 11 days; in 82, 12 days; in 111, 13 days; in 116, 14 days; in 158, 15 days; in 162, 16 days; in 146, 17 days; in 43, 18 days; in 28, 19 days; in 11, 21 days; in 6, 24 days; in 2, 26 days. The author submits the following conclusions: 1. Varicella is an infectious, eruptive disease which is specific and has nothing in common with variola. 2. The period of incubation varies greatly and is usually from 12 to 18 days. 3. In varicella there is a prodromic period. 4. An attack of variola usually confers immunity. 5. Varicella does not furnish any guarantee against vaccine.

An epidemic of varicella in a maternity hospital is reported by Apert. ¹⁴_{Sept. 1, '95} The paper refers particularly to newborn infants in which the author was able to correctly establish the duration of the incubation period. He concludes as follows: 1. The incubation period of varicella is fourteen days, as has been stated by Talamon and Guinon; this number was verified as many as six times during this epidemic. 2. The disease may readily affect nursing and newborn infants, contrary to the opinion advanced by classical writers. 3. Weak children, born before term, weighing from 1800 to 2000 grammes ($3\frac{3}{4}$ to $4\frac{1}{8}$ pounds), support the disease as well as the others, provided they do not present any previous infectious taint. 4. If the feeble newborn infants be tuberculous, the disease greatly aggravates their condition; it begins with quite a high fever, and the children succumb, either because the pustules take on a necrotic form (which the author observed twice) or because, after the abatement of the fever, the child falls into a more or less rapid cachexia. This fact is allied to the gravity of measles and whooping-cough in tuberculous subjects. 5. Finally, varicella appears to be most

contagious in the beginning, before the eruption, which renders the prophylaxis exceedingly difficult.

George Morgan, ²_{Sept.29,'94} in reporting a case of varicella bullosa, states that this form, whether regarded as a variety or a complication of chicken-pox, must be very rare, judging this not simply because it is so seldom met with in hospital or private practice, but because of the scant attention it has received at the hands of authors. That the case recorded was true varicella bullosa, and not pemphigus, there can be no doubt, for the following reasons: 1. It ran its course quickly as an ordinary case of chicken-pox. In a fortnight or three weeks the child was quite well. 2. Chicken-pox was epidemic in the street at the time. There were four cases in the same house. 3. The presence of typical varicella-vesicles covering the whole body. The following points are worthy of emphasis: 1. The exceedingly thin epidermal covering of the bullæ,—a covering thinner than that of a bleb from a burn or in pemphigus. 2. The thin covering rupturing early, generally at its upper border, before it has time to become tensely stretched by its fluid contents, as in pemphigus. 3. The rapid way in which the excoriated surface heals. 4. Its liability to chiefly affect very young children, the ages of the cases seen by the author being 7 months; her sister, 2½ years; one of Mackey's cases, 8 months.

J. B. Stephenson, of Bristol, Eng., ²_{Nov.10,'94} does not think that the condition is so rare as Morgan suggests, having seen within the present year at least two cases presenting almost precisely the physical appearances described. T. E. Stuart, of Harwich, Eng., ²_{Jan.12,'95} also reports several cases.

Concomitant Affections.—S. H. Snell, of Grays, Essex, ⁶_{Nov.17,'94} saw a case of concurrent varicella and scarlatina, and Szczypiorski ¹⁰⁰_{June 15,'95} notes several cases in which varicella and measles co-existed during a double epidemic. The eruption of varicella invariably appeared first and had not entirely disappeared when the eruption of measles was manifested. As varicella may be accompanied by a scarlatiniform, polymorphous, and even morbilliform rash, the differential diagnosis with exanthematous varicella should be established in such cases. The incubation period was delayed by measles in a patient seen by Hobart Cheesman, of New York. ⁵⁹_{July 27,'95} Spivak, of Philadelphia, ¹⁹_{Mar.30,'96} had a case complicated by gangrene of the scrotum, and Cheesman ⁵⁹_{July 27,'95} one complicated by parotitis.

Braquehay and de Rouville ¹⁴_{Sept.30,'94} state that varicella, like other eruptive fevers, may be complicated by arthritis during convalescence. The infection is due to the streptococcus. There are two forms,—one benign, resembling rheumatism, and terminating

in resolution; the other serious, suppurating, and causing systemic infection. Both forms are accompanied by general symptoms and marked elevation of temperature. All the joints are attacked, either from the outset or successively. If little patients recovering from varicella were carefully examined, arthritis would be found present very frequently, as would varicella in children suffering from so-called idiopathic arthritis.

Cassel¹⁵⁸_{B.17, H.5, 6, '94; May, '96} encountered six cases of renal disease in twelve patients seen during an epidemic of varicella in Berlin in the early part of 1894. The severity of the complication varied from albuminuria to actual nephritis, the earliest observation dating from the fourth or fifth day after the stage of desiccation had begun. Three of the cases were fatal, two of these not directly from nephritis, for one died of catarrhal pneumonia and the other of gangrene and lobar pneumonia, though it is certain that the renal complication largely determined the fatal result. The third case, a child 10 months old, died from acute nephritis on the twelfth day. Three other fatal cases of post-varicellous nephritis have been recorded by Högyes, Henoch, and Hagenbach. The two latter observers speak of acute parenchymatous nephritis, whilst Högyes states that in his case the convoluted tubules and loops of Henle were alone affected. The obvious lesson of these cases is that the urine, in a case of varicella, should be as carefully watched as in a case of scarlatina.

W. B. Nisbet, of Queensland,²⁸⁵_{Nov.15, '94} reports a case of uncomplicated chicken-pox, in a child 8½ months old, which proved fatal, owing, in his opinion, to the fact that the eruption covered every part of the body, even the palms of the hands and soles of the feet, and produced practically the same effect as an extensive burn. On the seventh day of the disease spots appeared in the mouth, which changed to irritable ulcers, causing great distress. Death occurred on the tenth day. Nisbet thinks that there was no question as to diagnosis, as four older children in the same house were ill with the disease, and there was an epidemic in the town at the time. Collie²⁰⁰⁸ states that "no physician has recorded a fatal case of chicken-pox." N. F. Schwartz, of Cleveland,¹_{Jan.19, '95} had a case so similar that he is inclined to doubt the correctness of Nisbet's conclusion as to the cause of death. Schwartz's patient died not from chicken-pox, but from effusion or hæmorrhage into the subdural and arachnoidal spaces of the brain, and œdema of the glottis resulting from the purpura hæmorrhagica which complicated the initial trouble—chicken-pox. The entire body was covered with ecchymoses.

INTUBATION.

By JOSEPH O'DWYER, M.D.,
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THE following quotation is from an able and exhaustive paper on the treatment of diphtheria by antitoxin, by W. H. Welch, of Baltimore ²⁰²⁷_{v.10, '95}: "An agent which would arrest the progressive descent of the diphtheritic process from the larynx into the bronchi and hasten the disappearance of the obstructive exudate is just what was needed to make intubation the ideal operation for the relief of the great majority of cases of croup requiring operative interference. Such an agent we now possess in antitoxin for a large group of cases, and we are not surprised, therefore, to find that the employment of intubation as a substitute for tracheotomy has been greatly extended by the introduction of serum therapy."

That we possess such an agent in antitoxin is amply demonstrated (1) by the remarkable results obtained with intubation and tracheotomy combined with the serum treatment, as compared with the results of these operations under any other method of treatment; (2) by the much larger percentage of recoveries from croup by the serum treatment alone, without the aid of surgery; (3) by the influence of this remedy in preventing the spread of the diphtheritic process from the pharynx to the larynx.

I quote again from Welch's paper: "No one can claim that laryngeal diphtheria requiring intubation or tracheotomy is anything but a severe disease. If the benefits of antitoxin are unmistakably manifested in these operated cases of croup, then the test is an *experimentum crucis*, and puts an end to the objections of those who assert that the apparently favorable results of serum therapy in diphtheria are attributable mainly to the large proportion of mild cases treated."

"In 41 reports there are 648 tracheotomies, with 258 deaths,—a fatality of 39.8 per cent.; 342 intubations, with 99 deaths,—a fatality of 28.9 per cent.; and 26 intubations, followed by tracheotomy, with 14 deaths,—a fatality of 53.8 per cent. The reports giving the previous or simultaneous fatality from tracheotomy contain 510 cases of tracheotomy, with 217 deaths, or 42.5 per cent. If the fatality of these cases be reckoned on the basis of the preceding or simultaneous fatality, selecting the lowest figures given, there would have been 329 deaths, or 64.5 per cent. There was,

therefore, an apparent reduction in fatality of 34.1 per cent. by the serum treatment.

"Making a similar estimate on the basis of previous fatality from intubation, there were 250 intubations, with 79 deaths, or 31.6 per cent., instead of 156 deaths, or 62.4 per cent. There was, therefore, an apparent reduction in fatality of intubated cases of 49.5 per cent. as the result of serum treatment. . . . Of Kossel's 44 cases of laryngeal diphtheria treated with antitoxin, 21 (47.7 per cent.) recovered without operation; of von Widerhofer's 130 stenotic cases treated with serum, 22 (16.9 per cent.) recovered without operation; of von Ranke's 63 cases, 21 (33.3 per cent.) recovered, etc. Von Ranke says that before the serum treatment at most 5 per cent. of his cases escaped operation, whereas now 33 per cent. escape."

[The testimony in favor of the statement that the use of antitoxin prevents the spread of the diphtheritic process from the nose and pharynx to the larynx is equally convincing. In support of this testimony such names as Roux, Bokai, von Ranke, Widerhofer, Baginsky, Ganghofner, Vierordt, and Escherich may be mentioned.—J. O'D.]

F. Helme³¹_{Nov. 17, '94} begins an article on intubation as follows: "If beyond our cold planet there is any corner of Eden reserved for the unfortunate inventors, the lamented Bouchut is undoubtedly there; and from such a distant abode he has a right to enjoy at the present day legitimate and pleasing satisfaction. In fact, like wines which are bettered by long voyages, the use of the tube comes to us from America by way of Budapest preceded by the highest reputation. Besides, it is to the hospital which bears the name of Trousseau that the old method, renewed and improved, enters now triumphantly."

[If there be a corner in the future Eden reserved for the unfortunate inventors who try to invent something, but fail, the space allotted to such must be a large one, and the lamented Bouchut is fairly entitled to a place in it. Bouchut, by the premature publication of his experiments with tubage before he had any results to show, and by his bitter denunciation of tracheotomy, then recently resuscitated, incurred the hostility of Trousseau, and with him that of almost the entire profession in France. Tubage was condemned as impracticable, and Bouchut, whose only revenge would have been success, admitted the justice of the verdict by abandoning all further attempts to perfect the procedure, and it died a natural death because it was prematurely born. The profession throughout the world was familiar with the bitter discussion on tubage, and with the important fact that the great Trousseau had con-

demned it. Is it, therefore, strange that no serious attempt to overcome stenosis of the larynx, through the natural passages, had been made for a quarter of a century following Bouchut's failure? It was necessary that these things should first be forgotten, and they could only be forgotten by the dying out of that generation of the profession. If, then, there be any merit in having successfully buried intubation for almost a quarter of a century, Bouchut is entitled to the full benefit of it.—J. O'D.]

Pusey, of Louisville, ²²⁴_{Oct. 6, '94} reports 107 intubations for croup with 48 recoveries,—44.8 per cent. He has never seen a false passage in efforts at introduction or injuries of any consequence to the soft parts while extracting the tube. In one case the head of the tube got below the vocal cords in efforts at removal, but was gotten out after some difficulty, with no bad results to the patient. In another case death was produced by blocking of the tube by loose membrane. He had never seen a fatal obstruction from pushing down membrane before the tube or from food or vomited matter. He refers to the numerous accidents that are said to be associated with intubation and attributes the most of them to the ill luck of some particularly unfortunate operators.

Morrison ⁹⁹_{Feb. 7, '96} reports 28 cases intubated for croup, with 12 recoveries. He ascribes the good results in part to forced feeding by means of the stomach-tube passed through the nose. In the course of the discussion on Morrison's paper, Whitney, of Boston, referred to his own experience with intubation in about 100 cases, with 30 per cent. of recoveries, which he says is near the average results. He thinks the percentage of recoveries might be increased considerably by forced feeding. Ball, ⁹_{Nov. 10, '94} in a paper on pseudo-membranous croup and diphtheritic croup, gives details of 11 intubations, with 5 recoveries. The first case was a complete failure, which was attributed to loose membrane in the trachea. It was his first case of intubation without any preliminary practice, and after more experience with the operation acknowledged that the tube was, in all probability, not placed in the larynx at all.

Turner ⁸¹⁴_{Apr. 1, '96} recommends that, in cases of obstinate recurring dyspnoea after extubation, tracheotomy be performed in order to give the larynx a complete rest. He considers ten days after the original intubation long enough to wait.

[Tracheotomy is never necessary in those cases except when the obstruction is due to granulation-tissue which cannot be removed through the natural passages or caused to disappear by the pressure of a properly constructed tube as described in former editions of the ANNUAL. Whether the recurrence of the dyspnoea be due to paralysis of the posticus muscles or to a persistence of

the inflammatory thickening of the mucous membrane, all that is required for a cure is the wearing of a properly fitting, rather small, intubation tube. It should be removed and a clean one inserted about once in five days. There was recently a case at the New York Foundling Hospital which required the use of the tube for over three months. A special tube was made, of a smaller size than that suitable for the age of the patient, having a larger retaining swell and larger head, the object being to produce a minimum amount of pressure in the chink of the glottis. The cause of the persistent stenosis was not determined, but it was most likely paralysis of the vocal cords.—J. O'D.]

Evans, of Louisville, ⁵¹_{Mar., '96} reports the sudden death of a child on the re-insertion of an intubation tube two hours after its removal on the seventh day. Evans ascribes the fatal result to pushing down a cast of the trachea before the tube.

[The fatal result in this and similar cases may be due to any one of three causes: 1. Asphyxia, from cutting off the small amount of air the patient is getting while inserting the tube. In the case referred to the patient was unconscious from carbonic-acid poisoning when the tube was re-inserted. 2. Pushing down membrane before the tube if the latter is not removed immediately when respiration is found to be suspended. 3. Making a false passage beginning in one of the ventricles. While this accident is not rare in unskillful hands, that it is not more common is due to the fact that the ventricles are usually obliterated by the infiltration of the tissues and the coating of pseudomembrane. It is, therefore, much more liable to occur on the introduction of a tube at the end of a week, when the disease has to a great extent receded, or in ascending cases before the tissues above the cords are involved. On several occasions I have entered one of the ventricles, under the circumstances named, and have wounded the tissue sufficiently to draw blood. A little more pressure would have carried the tube deeply into the tissues, and this could only have been demonstrated by a post-mortem examination. If these facts were only theories they would be strongly corroborated by the experience derived from practice on the cadaver, where it is difficult to avoid engaging in one of the ventricles; and once having entered and dilated a ventricle, it is almost impossible by further attempts to get beyond it. In former editions of the ANNUAL I have repeatedly called attention to this impediment to intubation, but few appear, so far, to have profited by it. Since writing the above the following case was observed: An infant, 10 months old, was subjected to the serum treatment for diphtheria beginning in the larynx and intubated later in the day. The membrane subsequently appeared in the

pharynx, but ran a favorable course. The tube was removed rather early on account of the serum treatment, but the dyspnoea recurred and the tube was re-inserted by an assistant who had had but a limited experience with the operation. As there was no attempt at breathing after the tube was in place, artificial respiration was tried without avail. The child was dead. A false passage was found at an unusual site,—viz., beginning at the base of the epiglottis, or about the anterior commissure of the cords. The tube was passed through the tissues and out under the skin; the head being in the larynx, completely obstructed respiration. This is the only instance of this kind with which I am familiar, and it can only occur when the patient's head is thrown too far back, which brings the lower end of the tube against the anterior wall of the larynx.—J. O'D.]

Duran⁵_{June, '95} reports a case of diphtheritic croup in a girl, aged 3 years, who was treated with antitoxin and subsequently intubated. She breathed better for several minutes after the insertion of the tube, when the facial muscles suddenly contracted. The eyes opened widely, a slight convulsion took place, and death followed. Artificial respiration was tried, without avail. The autopsy showed no lesion to account for the sudden death, which was ascribed to a reflex originating in the larynx, the bulb responding by cardiac paralysis.

[The report at hand does not state whether there was nephritis or not, or how long it required to place the tube in the larynx,—the two important causes of convulsions under these circumstances. I have known convulsions to occur in several cases from the partial asphyxia resulting from prolonged attempts to intubate. In one of my own cases convulsions occurred as soon as the tube was inserted, and the explanation was found in the temperature taken immediately after, which was 107° F. (41.7° C.). Without referring to my case-book, I can remember several of my intubated cases that died of uræmic convulsions, when doing well in every other respect with the exception of scanty secretion or total suppression of urine. There are, no doubt, many intubationists who, years afterward, can recall cases similar to the above that occurred in their early experience with this operation, and that without the aid of any notes. The impressions, under these circumstance, are lasting.—J. O'D.]

Bieser, of New York, ⁵¹_{Feb., '95} reports 22 cases of croup intubated, with 8 recoveries,—36 per cent. He gives the following as the chief dangers of laryngeal diphtheria: (1) suffocation; (2) heart-failure; (3) sepsis; (4) too much local treatment. Of eight reasons given for preferring intubation to tracheotomy, the sixth is worthy

of note as not being generally recognized: "It allows of more efficient coughing than does tracheotomy,—a point of prime importance when we reflect that efficient coughing is one of nature's methods of draining the air-passages of inflammatory products."

Variot ¹⁷_{July 13, '06} reports the accidental swallowing of four tubes following intubation for croup among 122 cases intubated. Two of the children passed the tubes, one in two days, the other in three days. The other two died from the effects of the disease, and the tube was found in one case in the stomach and in the other in the cæcum; in the latter case the child survived four days after the tube was swallowed.

[In the report no details are given as to how so many tubes came to be swallowed. If they were properly placed in the larynx and the string removed, it was an unusually large percentage of this accident. In only two out of almost five hundred cases of my own were tubes coughed out of the larynx and swallowed.—J. O'D.]

Bayeux ³¹_{May 25, '06} in a long paper on the frequency and gravity of the obstruction of intubation tubes in the treatment of croup, believes that he has found a means of obviating this accident by decreasing the length of the tubes.

[Bayeux claims to have studied the literature of intubation, and yet came to the conclusion that the inventor, in the construction of the tubes, had two principal objects in view (1) that they should reach as far down as the tracheotomy cannula; (2) to give the greatest possible mass to the tubes. Instead of giving the greatest possible mass to the tubes, my instructions have always been to use as little metal as possible without sacrificing any of the essentials of a perfect tube.

He also quotes Ferrand as saying that the tubes are kept in place principally by their weight. The weight was never considered as a factor of any importance in this respect; they are kept in place solely by the retaining swell, and the power that holds them is the vocal cords. Bayeux concluded, from experiments on the cadaver, that what he calls the subventricular portion of the tube was useless. What he means by the subventricular portion is not apparent, because he speaks of removing this portion of the tube, which would leave nothing but the head.

In the construction of a perfect intubation tube the length is as important as the breadth or thickness or calibre, and was arrived at not by experiments on the cadaver, but by a long series of experiments on the living, every step in the evolution of this instrument having been suggested by post-mortem findings. If in croup the disease were always confined to the larynx, the necessity for long tubes would not exist, and in all probability the necessity for

their continuance would have ceased to exist on the introduction of the serum therapy, could this treatment always be adopted on the first symptoms of invasion of the larynx. It is well known, to those who have had a large experience in the treatment of croup, that in only a small percentage of cases is the disease confined to the larynx when sufficient time has been given for it to spread downward; that is, by the late performance of intubation or tracheotomy. In fact, the greatest mortality following both of these operations, before the introduction of the serum treatment, was due to the extension of the pseudomembrane to the bronchial tubes. It made very little difference, in this class of cases, whether long or short tubes were used, but it made a very great difference when the disease stopped short in the trachea at any point below the distal extremity of the tube, because the obstruction is not due, as Bayeux observes, to membrane dropping down from above, but to membrane that is already down and which closes as a valve around the lower end of the tube. False membrane becomes quickly detached in the trachea and bronchi, but remains long adherent in the larynx; the result is a soft, flexible tube, lying loose in the trachea, only suspended from above. This loose cast, when confined to the trachea, does not obstruct inspiration, but with expiration, especially when forced, closes around the distal extremity of the tube, producing complete obstruction to the exit of air. This is the greatest of all dangers attending the wearing of an intubation tube, and is the principal cause of the sudden deaths that occur from obstruction. Does it need any argument to prove that a tube reaching only one inch below the vocal cords will not be obstructed more frequently than one an inch or more longer? This is the only reason for the present length of the tubes, to which there are several minor objections. They were at one time very short, and again much longer than at present, but had to be curtailed for reasons not necessary here to discuss.

The serum treatment, which prevents the downward spread of the disease, will not dispense with the necessity for long tubes, because croup occurs principally amongst the poor, who do not seek medical advice except in severe illness; and diphtheria, when confined to the larynx, is not a severe illness until sufficiently advanced to obstruct the breathing. The disease often exists for several days before this occurs, and the membrane is already well down in the trachea before the serum treatment can be resorted to. Of the many advantages that Bayeux claims for the short tubes, most of which are purely theoretical, there is one that seems reasonable and probable,—viz., the greater ease with which they can be expelled by pressure from the outside, or what he calls enucleation.

I have had no personal experience with this method of removing tubes, except on the cadaver, where it is easy enough; but I know of several intubationists in this country who never use an extractor, but always accomplish it by expression. Cheatham, of Louisville, I believe, claims to have been the first to adopt this method. Bayeux modestly claims that cutting a portion off the tube and removing it from the larynx by external pressure entitles it to the name of a new procedure.—J. O'D.]

The following is from an editorial ³⁵_{Aug. 31, '96}: "In hospitals intubation replaces tracheotomy more and more. With serum the first gives a mortality of 23.8 per cent., while tracheotomy gives a mortality almost three times as great,—62.5 per cent. Furthermore, it must be observed that, with children who recover, the tracheal stenosis caused by the incision constitutes a grave infirmity. Indeed, few, as the statistics of the board of revision prove, reach adult life." Passages are then quoted *in extenso* from what is called a remarkable work devoted to the study of intubation in croup, by François Baudoin, and from an article by Gillet, ³⁵_{Nov. 29, '90} disproving the absurd notion, still held in some quarters, that intubation is a hospital operation, and not suitable for private practice. "Jacques, in 158 intubations, has done only 10 in hospital, and these 158 have given him a mortality of 65.8 per cent.,—a result which would have made the tracheotomists envious before the advent of serum. Egidi, of Rome; Massei, of Naples; Galatti, of Vienna, and Bonain, of Brest, regularly employ intubation in private practice, not only since serum therapy, but before it, and that with greater success than is given by tracheotomy."

Delvincourt ⁵⁷⁷_{June 30, '96} reports an interesting case treated at the Hôtel-Dieu for laryngeal diphtheria, in the service of Hoche. The child was 3 years old and suffering from severe dyspnoea when admitted. It was given a dose of serum and intubated. A piece of small-sized catgut was attached to the tube instead of silk, as it was thought that this would be less liable to be cut by the teeth. During an attack of suffocation, the next day, on attempting to remove the tube by pulling on the string, the latter was found to be divided, and the extractor was resorted to, as it was believed that the obstruction was due to false membrane. On introducing the finger behind the epiglottis the head of the tube could not be felt; something soft interposed, and it was therefore inferred that the tube was sunk deeply in the larynx. After two failures to remove the tube by the extractor tracheotomy was hastily performed, as the child was asphyxiated. When the trachea was opened an attempt was made to push the tube up or down, without success, and the child died during the attempts.

At the autopsy the tube was found in its proper place in the larynx, with its head resting on the vocal cords. The operator's failure to locate the tube with the finger and to remove it with the extractor was due to the catgut, which was coiled over the upper extremity of the tube and swollen to several times its normal dimensions by the absorption of moisture.

[If this were not the sole cause of the obstruction, it was amply sufficient to produce fatal apnœa, as I have known a silk thread to produce serious dyspnœa in the same manner. In performing tracheotomy after intubation it is important to remember that, unless the cricoid cartilage be cut, it is impossible to pull an intubation tube downward through the wound; it must be pushed upward, and this is easily done with a small forceps or by making lateral pressure on the trachea outside.—J. O'D.]

Meslay¹¹⁸_{July, '95} reports a case of prolonged intubation followed by tracheotomy, with consecutive ulceration of the trachea and mediastinal abscess. It was the case of a child, 3½ years old, suffering from diphtheritic croup, who was given the usual dose of serum, and, later in the day, intubated. On the sixth day the tube was removed, but had to be replaced in twelve hours. In three days the tube was again removed, but the dyspnœa continued in the interval and the tube was re-inserted for the third time, after having been out for two days. Injections of serum were given daily. After fifteen intubations, in about a month the child was able to do without the tube, but still suffered a good deal from dyspnœa and wasted rapidly. It was taken home, but was returned to the hospital after a week in an extreme state of emaciation, with increased dyspnœa. The diagnosis was now made of disease of the mediastinal and bronchial glands pressing on the recurrent nerves. Intubation was again resorted to and repeated at frequent intervals, as the little patient, on account of the paralysis of the vocal cords, regularly expelled the tube. Tracheotomy was now practiced, more than two months after the first intubation, and death followed five weeks later. At the autopsy an abscess was found in the anterior superior mediastinum, the origin of which was traced to an extensive perforation on the anterior wall of the trachea, which was produced by the lower end of the cannula. The bronchial glands were enormously enlarged, accompanied by tubercular infiltration of the lungs. Both recurrent nerves were involved in the mass of tubercular glands. The author comments on the absolute integrity of the larynx and upper part of the trachea, notwithstanding the wearing of an intubation tube for nearly six hundred hours, as contrasted with the extensive ulceration produced by the tracheal cannula in a much shorter time.

He also refers to the frequency of acute tuberculosis following diphtheria.

Hailes, of Albany, ⁵⁹_{Oct. 9, '96} reports the case of a child, 2 years old, that was intubated for croup and soon after developed gangrene of the leg below the knees, due to an embolus, which eventually required amputation.

Bonain, of Brest, ¹¹⁸_{July, '96} reports an interesting case of obstruction due to the presence of a foreign body in the larynx. It was an infant, 15 months old, that had swallowed a fragment of a nut-shell. Intubation was performed—everything having been prepared to do tracheotomy if necessary—with complete relief. The tube was removed at the end of twenty-four hours, and, although some dyspnoea and hoarseness continued for several days, it was not necessary to re-intubate. The child was seen a month later in perfect health. A similar case was reported by Meltzer, of New York. A tube was inserted and the string left attached. During the night, while the nurse slept, the child freed its hands, which had been tied, and pulled the tube out. The foreign body was found impacted in its distal aperture. There was no recurrence of the dyspnoea.

Courtade ²⁴_{Dec. 9, '94} has a long paper on the early history of tubage and intubation. He discusses at considerable length the comparative merits of intubation and tracheotomy, but the statistics given are old, such as those reported at the Berlin Congress in 1890, and therefore of little value.

[All statistics that antedate the serum treatment of croup are of no further value except for purposes of comparison, and it is only a waste of paper and ink to quote them.—J. O'D.]

Courtade gives an interesting quotation from the discussion on tubage at the time that Trousseau, chairman of the committee appointed to investigate this subject, made his report condemning the procedure. Malgaigne said: "Who knows if tubage will not be, some day, for croup what lithotomy is for stone in the bladder? I reject all your conclusions. You cannot say that tracheotomy may be the only means of combating croup when medical measures are exhausted. You have only hypotheses, which neither allow you to approve nor condemn tubage."

Paul Ferroud ²¹²_{Nov. 10, '94} has published a pamphlet on intubation of the larynx in children and adults. He gives a complete historical review of the operation, its accidents, dangers, and complications, and has modified the instruments, but in what the modification consists I am unable to state, not having the original work at hand. Ferroud has given to his work the following epigraph of Malgaigne: "If I do honor to the real author of trache-

otomy, what honor will he not deserve who will arrive to deliver us from it?"

Chronic Stenosis.

Claude ¹¹⁸_{July, '05} reports the case of a girl, aged 14 years, intubated for the relief of dyspnœa due to tubercular disease of the larynx. When admitted to the hospital the glands of the neck were very much enlarged; the voice was lost; there was severe cough and some dyspnœa. Two days after admission a severe attack of dyspnœa supervened, and intubation was practiced with complete relief. Swallowing was very difficult and painful, which necessitated feeding by the stomach-tube. At the end of four days the tube was removed and the breathing continued fairly good for three days, when a sudden attack of suffocation proved fatal. Tracheotomy was hastily performed, followed by artificial respiration without avail. At the autopsy extensive ulceration was found, especially in the subglottic region, which extended through the whole thickness of the mucous membrane, laying bare the cartilages, which were partially necrosed. Tubercle bacilli were found in the ulcerated mass, but not in the lungs, which were healthy with the exception of some recent pneumonia. The author advises tracheotomy in this class of cases in preference to intubation, because the latter is likely to aggravate the existing ulceration.

In a brief report of the case of a boy, aged 4 years, suffering from laryngeal stenosis (cause not stated), Cholmeley ³²_{May, '05} performed tracheotomy. On account of the high position of the isthmus of the thyroid it was found necessary to divide the cricoid cartilage. The cannula could not be dispensed with and an attempt to intubate was made at the end of two weeks, but the stricture was so close that a small tube could not be passed. Seven weeks later sounds were passed up through the wound, dilating the larynx until the smallest intubation tube could be introduced. This was changed in a week for the next size and the external wound was allowed to close. Nine days later the full size for the aged was inserted and worn for three weeks, having been removed for the purpose of cleansing once a week. The case was seen one month afterward, when there was no return of the obstruction.

[In former editions of the ANNUAL I have called attention to the importance of pursuing the course that was adopted in this case,—viz., dilating from below when the tube cannot be inserted from above without using force. A very slight enlargement of the external wound is all that is necessary for this purpose. In trying to force a passage from above the operator can never be certain whether the tube is engaged in the stricture or in one

of the ventricles, and if in the latter a false passage is sure to follow. The cause of the retained cannula in this case was the high operation, which involved the subglottic division of the larynx, giving rise to a secondary stricture at the upper angle of the wound and just below the vocal ends,—a common occurrence under the circumstances.—J. O'D.]

Chiari ³¹_{Nov. 14, '94} reports the case of a woman, 46 years old, on whom he performed intubation for the relief of dyspnoea due to acute subglottic œdema. A No. 6 tube was used, which was retained twenty-four hours. It was expelled and re-inserted after some hours when the dyspnoea returned, with permanent cure.

[The No. 6 tube used in this case must have been of the adult set of ten tubes, although it is not so stated. It is quite possible that it was the largest of the croup tubes, which has often been used in adults and sometimes with disastrous results. Many still believe that the largest of the children's tubes, No. 6, is intended for adults, although a little knowledge of the anatomy of the adult larynx should convince them to the contrary. This tube is not safe, even immediately after the age of puberty, without a strong string attached, owing to the rapid increase in the size of the larynx at this period of life.—J. O'D.]

Lehmann, of Dresden, ¹¹_{June, '06} reports the case of a child, 1 year old, in which high tracheotomy was performed for the relief of croup. The cannula could not be removed on account of granulations, and a low tracheotomy was performed, followed by intubation, with cure.

[The abstract at hand does not state why a second tracheotomy was resorted to before practicing intubation. I cannot imagine any circumstances under which it would be necessary. If no other operation were available it is quite comprehensible that a low tracheotomy might accomplish something, by allowing the wound that involved a portion of the larynx to heal, and thus getting rid of the granulations produced by the cannula. Granulation-tissue is seldom the real cause of the obstruction in these cases, but is often the imaginary cause. When they come to be operated on a very substantial stricture will generally be found, which requires a good deal of force to dilate.—J. O'D.]

Galatti ³⁷_{Apr., '06} reports the case of an infant, 20 months old, that wore a tube in the larynx almost continuously for four hundred and thirty-six hours. Intubation was practiced for the relief of a sudden development of dyspnoea following recovery from an attack of pharyngeal diphtheria. During this period the tube had been removed and replaced ten times. Tracheotomy was proposed after the tube had been retained three hundred hours, but

the mother absolutely refused to allow the operation,—to the great advantage of the child, no doubt.

Schmiegelow, of Copenhagen,¹³⁶_{Oct. 5, '94} in an article on intubation of the larynx in adults, describes the different forms of chronic stenosis and the difficulties encountered in their treatment. The rarest form, and at the same time most difficult to cure, he truly says, is complete obliteration of the larynx. The only case of this kind that he has yet had was that of a boy, aged 7 years, on whom high tracheotomy had been performed, the cannula having been inserted just below the thyroid cartilage, causing extensive ulceration in the larynx, followed, on healing, by agglutination of the contiguous parts. Laryngo-fissure with excision of the diaphragm was resorted to, followed by intubation. The treatment was continued for over a year and had reached a point where the patient could breathe through the larynx for several hours without the tube, when death accidentally occurred from the aspiration of food.

[Schmiegelow says he does not know of a case of complete obliteration of the larynx in which a permanent cure was effected. Evidently he does not read the ANNUAL, or he would have known of at least one such case.—J. O'D.]

He has devised a tube with an opening corresponding to that in the trachea, into which another tube is inserted at right angles and fastened there by means of a screw. It serves the triple purpose of keeping the external wound open, preventing the expulsion of the intubation tube, and giving another channel for the entrance and exit of air in case of obstruction above, as the screw can be quickly removed.

Northrup¹¹_{Oct., '94} contributes an excellent paper on intubation in acute stenosis of the larynx, under the following subdivisions: When to operate. How to operate. How to remove the tube. When to remove the tube. Dangers and difficulties of the operation. Dangers and difficulties of wearing. Dangers of removal and thereafter. Retained laryngeal tubes. Feeding after intubation.

O'Dwyer¹¹_{Oct., '94} contributes a paper on intubation in the treatment of chronic stenosis of the larynx, based on personal experience with this class of cases. All cases of chronic stenosis requiring intubation are divided into two classes: (1) those in which the operation is practiced for the double purpose of relieving existing dyspnoea and at the same time producing gradual dilatation of the stricture; (2) those in which it is resorted to in order to get rid of retained tracheal cannulae. Illustrative cases are reported and the various forms, location, and different degrees of stricture of the larynx are described, with instructions necessary to avoid accidents during the operation and afterward.

New Devices.

Dillon Brown⁵⁹_{June 29, '95} describes a new extractor, which is attached to the tip of the finger by means of a ring. It consists of a hook extending close to the palmar surface of the tip of the finger, which catches in a wire rim fixed in the posterior portion of the head of the intubation tube.

Lewinthal³⁶⁴_{July 15, '95} describes a similar device with the addition of an introducer, the latter consisting of an arrangement for attaching the obturator to the under surface of the ring. No cases are reported by either of these gentlemen.

L. Bors, of New York,¹_{June 29, '95} recommends forced dilatation of the larynx, by means of a three-bladed, jointed dilating cannula, as a substitute for intubation and tracheotomy in the treatment of croup. It is said to require only a few minutes in the application and to be satisfactory, but no cases are reported or results given.

Egidi, of Rome,⁹²¹_{v.1, No.35} has again modified the intubation instruments so as to make one instrument serve for both the introduction and extraction of the tubes. It is identical with the ordinary extractor, but of much shorter curve. To use it as an introducer the obturators are made hollow, and into this the nibs of the extractor are passed and held in place by pressure on the lever, the tube being pushed off, when in place, by the finger which holds the epiglottis erect.

[A single instrument cannot be constructed to serve both purposes satisfactorily. If the tubes are long the curve on the introducer must be short, else the difficulty of entering the larynx is increased, and the tubes cannot be removed with a short-curved extractor, such as illustrated in Egidi's paper, except in very young children. The long-curved extractor in general use was the result of many experiments with different curves and angles. If the tubes used by Egidi are fairly well represented in the wood-cut referred to, they possess every important defect that a good deal of ingenuity could devise. The upper extremity of the head or shoulder, as shown, has a cutting edge all the way round, even under the epiglottis; the tubes are perfectly straight, and the metal on the distal extremity is very thin anteriorly, which forms another cutting edge calculated to do some fine execution on the anterior wall of the trachea during every act of swallowing. Antitoxin, irrespective of its life-saving qualities, will be a great blessing to many innocent sufferers, because by its use it will be possible to dispense with such instruments of torture much sooner than heretofore.—J. O'D.]

RHEUMATISM AND GOUT.

By N. S. DAVIS, M.D., LL.D.,

CHICAGO.

Acute Rheumatism.

Etiology.—Perhaps the most important contribution to the literature of acute rheumatism or rheumatic fever during the past year is furnished in the Milroy lectures, on the natural history and affinities of rheumatic fever, delivered before the Royal College of Physicians of London by Arthur Newsholme, ⁶_{Mar. 9, 16, '95} of Brighton. The author distinctly claims that rheumatic fever is a specific febrile disease, as the following quotation from the introductory part of his first lecture will show. He says: "I propose to restrict myself strictly to rheumatic fever (acute and subacute rheumatism),—at least, until the affinities of the disease come to be considered; and by rheumatic fever I mean a disease in which there are pain and swelling of the joints, preferably of the larger joints, accompanied by fever, the joint affection having a migratory character and usually yielding rapidly to treatment by salicylates, but liable to complicating inflammation of the pericardium or other visceral serous membranes." Having by this definition excluded from consideration all the so-called varieties of chronic and non-febrile cases of rheumatism, he proceeds to consider, first, the epidemiology of rheumatic fever, using the word "epidemic" to mean simply "excessively prevalent," without regard to the question of infection. After an unusually extensive review of the records of disease prevalence in different countries, including hospital records and tables of mortality for a series of years, the lecturer shows sufficient irregularities in the degree of prevalence of rheumatic fever in different years to justify designating the more active periods of prevalence as epidemic. He divides these epidemic periods into two classes,—“one lasting from one to three years and the other from six to eight years.” As the latter were noticed mostly in large centres of population it was conceded that they might be the result of several minor epidemics combining together. No regular periodicity in the epidemics could be traced, the periods of most marked prevalence in England being in 1855, 1856, 1859, 1864, 1865, 1868 to 1871, 1874 to 1876, 1884, 1885, 1888, and 1893.

[It is worthy of remark that these periods are either in close proximity to, or identical with, notable periods of epidemic influenza. For instance, the periods from 1855 to 1859, from 1868 to 1874, and from 1888 to 1893 cover three of the most noted periods of epidemic influenza during the last half of the present century.—N. S. D.]

In concluding his investigations concerning the epidemiology of rheumatic fever, the lecturer very appropriately remarks that: "With our present imperfect information my attempt to describe the natural history of rheumatic fever is not unlike that of the paleontologist who from a few fragments of bones attempts to build up the skeleton of an ichthyosaurus. The data already given, however, enable us safely to reach certain general conclusions: 1. All the hospital records, all the Scandinavian imperial returns of cases, and all the death returns agree in manifesting very great irregularities in the yearly incidence of rheumatic fever, the excesses of prevalence in certain years being so great as to merit the name of *epidemic*." In the same patient and thorough manner the lecturer reviews the facts derived from the influence of climate, geography, season of the year, rain-fall, and ground-water. He freely admits that all these exert more or less influence on the prevalence of rheumatic fever, as do age, modes of living, and individual susceptibility. In his fourth lecture, ²²_{Apr. 3, '95} Newsholme briefly reviews the clinical features of rheumatic fever and compares its mode of onset, progress, tendency to relapse, etc., with the clinical features of typhoid fever and other infectious diseases, and then gives a brief summary of such facts as point more directly toward the infectious nature of the disease. His general conclusions are that "rheumatic fever is a specific febrile disease, caused by the introduction from without and multiplication in the system of a pathogenic micro-organism," and that, on the whole, he "inclines to the view that rheumatic fever is caused by a saprophytic organism having a tendency to assume a parasitic life," etc. He acknowledges, however, that the specific germ has not yet been identified.

The causes of acute rheumatism and its relation to other affections formed the subject of a very interesting discussion in the section in medicine at the recent meeting of the British Medical Association. ⁶_{Aug. 17, '95} The discussion was introduced by Cheadle, of London, and continued by Sir Dyce Duckworth, A. Garrod, A. Mantle, Sir T. Grainger Stewart, H. Handford, Stephen Mackenzie, A. Haig, D. B. Lees, and Longhurst. All except the last three named favored the views set forth in the lectures of Newsholme concerning the classification of acute rheumatism with spe-

cific febrile affections and referring its essential cause to a micro-organism. The three last named opposed the views, but the discussion elicited no new or important facts.

In a paper read before the Society for Internal Medicine of Berlin, on the relations between acute rheumatism and endocarditis and myocarditis, Leyden ⁹_{Jan. 19, '95} reported a number of cases of acute rheumatism complicated by endocarditis, myocarditis, or pericarditis, "in most of which he had been able to isolate a delicate diplococcus, differing from any hitherto described, and unequivocally distinguishable from the various forms of staphylococcus, the streptococcus, and the diplococcus of pneumonia. The inference drawn is that this organism is the cause of acute rheumatism and likewise of the secondary complications."

Birch-Hirschfeld in 1888, Bouchard and Charrin in 1891, Triboulet the same year, Sahli in 1892, and J. Sacaze in 1894, all report ⁵⁹_{Dec. 1, '94} having repeatedly found the staphylococcus albus and sometimes streptococci in the synovial fluid of articulations, in pericardial fluid, and in the cardiac valves in cases of acute and subacute rheumatism.

Sacaze, of Montpellier, further claims that these organisms may gain access through wounds or parts otherwise injured. ³_{Nov. 21, '94} On the other hand, M. F. Chvostek ²_{Aug. 17, '95} claims that Singer was not justified in looking upon the bacteria found in the urine of patients with rheumatism as the exciting cause of that disease, inasmuch as he had found none present in the urine of nine patients out of twelve examined, while he had found cocci present in the urine of ten out of eighteen healthy persons when the urine was not drawn through a catheter. Chvostek also examined simultaneously the blood, urine, and synovial fluid of twelve cases of acute rheumatism, and in every case, as regards the synovial fluid, the results were negative unless the joint affection was due to sepsis or gonorrhœa.

Heidenhain ⁵⁷_{Aug. 13, '95} claims that monarticular rheumatism had been observed in thirty-eight cases out of a total of fifty-one recorded in the polyclinic at Greifswald, which indicates that rheumatic disease confined to a single joint is not so rare as it is generally supposed to be, unless the diagnoses were faulty. Buss, in his paper ³²⁶_{B. 54, H. 1 ; Apr. 6, '95} on the "Relations of Angina and Acute Articular Rheumatism," not only admits the frequent coincidence of angina and acute rheumatism, but claims that the angina generally precedes the articular disease and that both are caused by microbic infection.

Weber, ¹⁴_{Feb. 17, '95} in a discussion on the etiological relations of influenza and polyarticular rheumatism, claimed that there existed

between these diseases not only a coincidence, but a relation of cause and effect. Constantin Paul favored the same view, while Barbier and Ferrand opposed it, claiming a separate specific cause for each of the two diseases.

Treatment.—Notwithstanding the marked tendency noticeable in the literature of the past year to regard acute articular rheumatism as a specific general fever of bacterial origin, there is appearance of greater unanimity in relying upon the salicylates in its treatment than at any previous time. The favorite preparation appears to be the sodium salicylate, to be given in efficient doses until the pains and fever are relieved, and then continued moderately for ten days longer or until convalescence is established. P. M. Latham, in a paper before the Cambridge Medical Society, earnestly recommends ²_{Jan. 28, '95} the use of the true salicylic acid obtained from the vegetable kingdom, without any combination with alkalis, and given in large doses repeated at short intervals until some cerebral disturbance is produced, and then at longer intervals until all symptoms of the disease are removed. In the early stage he deems it very important to have the bowels moved freely each day by from 2 to 5 grains (0.13 to 0.31 gramme) of calomel at night, followed, if necessary, by a saline laxative in the morning. Desplats, of Lille, ³⁵_{June 15, '95} also recommends the giving of large doses repeated at short intervals until specific effects are induced, but he uses the sodium salicylate often to the extent of from 8 to 12 grammes (2 to 3 drachms) a day.

On the other hand, Henri Huchard, of Paris, ¹_{Jan. 12, '95} while equally commending the use of liberal quantities of the sodium salicylate, emphasizes the advantage of giving it in small or divided doses, as 1 gramme (15½ grains) every two or three hours until the desired relief is obtained. As it has sometimes been found difficult for patients to tolerate a sufficient quantity of the sodium salicylate by the stomach, Erlanger, ²²_{Oct. 31, '94} in the Clinical Institute at Munich, treated twenty-one patients with the salicylate administered in the form of enema. The rectum was first made free from fæces and then from 5 to 8 grammes (1½ to 2 drachms) of sodium salicylate, 1.5 grammes (24 minims) of tincture opium, and 100 grammes (3¼ fluidounces) of water at the temperature of the body were given as an enema. The average duration of the treatment was four to six days, and the number of enemata administered to each patient varied from three to six. Of the twenty-one patients treated thirteen were completely cured and eight materially benefited. Carrieu ³⁵_{Oct. 27, '94} ⁹⁰_{Dec.} and Weiss ³⁶⁰_{Apr., '95} recommend the use of salicylic acid in the form of ointment applied freely to the articulations affected. Carrieu's formula is:—

R Salicylic acid,
Oil of turpentine, āā 5 grammes ($1\frac{1}{4}$ drachms).
Lanolin,
Vaselin, āā 40 grammes ($1\frac{1}{4}$ ounces.)

Eshner ¹¹⁹_{Aug. 17, '95} reports having treated several cases of both acute and subacute rheumatism successfully with strontium salicylate, given in doses of 10 to 15 grains (0.65 to 1 gramme) every three hours.

Drappier, of Auvilliers-les-Forges, ²²⁰_{Nos. 37, 38, '94} has reported one or more cases of severe acute articular rheumatism in which sodium salicylate was rejected by the stomach, but which were permanently relieved by nitrate of pilocarpine, given by subcutaneous injection in doses of 0.01 gramme ($\frac{1}{6}$ grain) each. Marfan, of Paris, ³⁵_{Mar. 30, '95} has an interesting article on acute articular rheumatism as it occurs in infants and young children, more especially when attacking the neck; and Dupont ¹⁰⁰_{July 11, '95} reviews at considerable length the subject of acute rheumatism in early childhood.

Chronic Rheumatism.

Rheumatic Complications.—A. Claus ¹⁹_{May 18, '95} discusses the connection between arthritis and sciatica and other neuralgic affections; M. A. Piassetzky ³¹_{July 6, '95} directs attention to rheumatism of the skin; and G. W. Cook, of Washington, D. C., ²⁷_{Apr., '95} comments on the frequent connection of rheumatism and chorea. Duclos, of Tours, ¹⁷⁵_{Aug., '95} relates several clinical cases illustrating the frequent alternations of arthritic attacks of both gout and rheumatism with severe pulmonary, cardiac, and other visceral affections. J. Davezac, of Bordeaux, ¹⁸⁸_{June 9, '95} and Dreyfus-Brisac ³_{July 3, '95} also relate cases of rheumatism complicated with visceral disease. A. C. Flack, of Fredonia, Kan., ⁴³⁰_{June, '95} relates a case in which the heart was affected four or five days before any joint symptoms appeared. Spiridon Kanellis, of Athens, ⁷³_{v. 20, p. 58, '94} relates a severe case of acute articular rheumatism in an extremely anæmic female aged 17 years. There were no signs or symptoms of either cardiac or renal complication, but on the twenty-sixth day the upper third of the right leg was attacked with very severe pain and a red discoloration of the skin, which soon changed to purple. In a few days the whole leg became gangrenous, and, when a line of demarkation had formed, the limb was amputated at the lower third of the thigh by Galvani, and the patient recovered. A. R. Allen, of Carlisle, Pa., ¹¹²_{Aug., '95} relates the case of acute articular rheumatism, in a girl aged 10 years, complicated by acute endocarditis. On the fifth day after the case came under observation a large blister was "found covering the toes and extending as far

back as the junction of the tarsal and metatarsal bones, except on the inner aspect of the foot." The parts covered by the blister were soon found to be gangrenous and subsequently sloughed off, leaving the bones of the toes naked, and they were taken off at their tarsal articulation. The parts healed and the patient recovered. It was supposed that the gangrene was induced by a fibrinous clot detached from the endocardium and lodging in the external plantar artery.

Treatment.—Pierre Marie, of Paris, ³¹_{Dec. 15, '94} divides the cases of chronic arthritis deformans into two classes,—such cases as are the sequel of primary acute rheumatism and such as develop slowly and without febrile symptoms. The first he regards as infectious and best relieved by salol; but the second originates from constitutional disorder and is most relieved by the use of iodine or the iodides. W. S. Hedley, of Brighton, Eng., ²⁶_{Mar. 1, '95} reports four cases of rheumatoid arthritis treated with benefit by inclosing the affected articulations in cylinders containing hot air for forty or forty-five minutes, commencing the temperature at 160° F. (71.1° C.) and gradually increasing it to 240° F. (115.5° C.) before the end of the time. The pain and stiffness were much relieved in each case. For the treatment of chronic articular rheumatism Letulle ⁹_{Nov. 17, '94} recommends "rest in bed, the repeated application of the actual cautery to the affected articulations, passive movements of the joints, sulphurous baths alternating with warm douches of simple or sulphuretted water, in conjunction with the internal administration of potassium iodide in doses of from 0.50 to 2 grammes (7½ to 30 grains) in twenty-four hours." P. Nichaus ⁸¹⁴_{Jan. 1, '95} claims that the only way of getting rid of the nodosities of rheumatic origin, when chronic, is to soften them by the application of emollient warm poultices continuously for one or two days, and then crush them under the skin by energetic kneading while the patient is under the influence of an anæsthetic. This is to be followed by gentle daily massage, which completes the cure in one or two weeks. Alexander Pöchl, of St. Petersburg, ⁶_{Aug. 31, '95} in a paper on the "Influence of Spermin on the Metabolism in Auto-Intoxications in General and the Uric-Acid Diathesis in Particular," recommends, strongly the use of spermin in the treatment of cases of rheumatoid arthritis.

Gout.

Etiology and Pathology.—During the year papers have been read before different medical societies by Louis Faugères Bishop, of New York ⁵⁹_{Apr. 18, '95}; Landon B. Edwards, of Richmond, Va., ¹_{Apr. 20, '95} and Ralfe, of Islington, Eng., ⁶_{Nov. 10, '94} in which the well-known chem-

ical theories of Roberts, Haig, Garrod, and others, concerning the etiological relations of uric acid to gout, are reviewed and discussed in an interesting manner. But they contain no new or additional facts to enable us to reconcile the various theories and discordant opinions that everywhere prevail. F. Grandmaison¹⁰⁰_{Nov. 24, '94} presents an interesting paper relating to the connection of albumin and renal disease with gout. While claiming the very frequent, if not constant, association of renal disease with gout, he admits that during the early or premonitory stage the presence of albumin in the urine is often intermittent, and therefore requiring repeated tests to avoid mistakes.

R. Shaw Tyrrell, of Toronto, Can.,⁵⁹_{Sept. 29, '94} claims a close affinity between gout and rheumatism, and that both are due to inefficient elimination. Hence he insists on the great importance of maintaining the functions of the skin, kidneys, and bowels in a state of activity. Jaccoud³_{May 15, '95} discusses at some length cases of gout, and more especially saturnine gout without involvement of the articulations. Mabboux¹¹²_{June, '95} says that an attack of renal gout consists in hyperæmia, and may be accompanied by hæmaturia or not. Renal gout is distinguished from renal calculi by the attacks commencing generally with a chill, the pains always bilateral, and the passage of bloody urine is not painful. Debout d'Estrées, of Contrexèville,¹¹²_{Mar., '95} relates an interesting case of acute gout in which the attack commenced in the right parotid gland, but a day later it passed to the left knee.

F. Levison, of Copenhagen,⁶⁷³_{Mar., '95} concludes, as the result of many post-mortem examinations, "that gout is not so uncommon a disease in Denmark as was formerly supposed, that it is always combined with primary renal atrophy, and that this latter condition is, in all probability, indispensable to the development of gouty deposits."

J. B. Berkart, of London,²_{Feb. 2, '95} gives an interesting paper, in which he dissents from both the uric-acid theories of Haig, Roberts, and Garrod and the sudden necrosis of Ebstein, and contends that the primary steps in the pathology of gout consist in perverted nutrition or active development in the affected parts of elliptical cubical, and polygonal cells with nuclei and granular protoplasm, many of which become fused, constituting giant-cells. These cell-proliferations he regards as the primary lesions and the uretic deposits as secondary. He sustains his views by minute dissections and microscopical examinations. G. Klemperer, of Berlin,³_{July 10, '95} presents an interesting array of facts, which appear to prove the presence of uric acid at the onset of gout to be very variable, being sometimes increased and at other times diminished;

that we sometimes have attacks of gout without uretic deposits and sometimes uretic deposits without any symptoms of gout.

[From all the foregoing diverse opinions we are constrained to think that both gout and rheumatism are complicated pathological conditions, capable of being produced not by any one etiological factor exclusively, but by varied combinations of many factors.—N. S. D.]

Treatment.—Labatut¹⁰⁰_{Dec. 4, '94} gives a long article on the treatment of articular gout and rheumatism by the introduction of lithium by electricity. He prefers immersing the patient or the affected parts in baths holding the lithium in solution and applying the electric currents in varying degrees of intensity, having reference to the degree of activity of the disease. W. Morain,⁶⁷_{July 30, '95} in mild attacks of acute gout, recommends only absolute rest, diluent drinks, and the application to the affected joints of an ointment composed of sodium salicylate (5 grammes— $1\frac{1}{4}$ drachms) and lanolin (50 grammes— $1\frac{1}{2}$ ounces). In severe attacks he administers, in addition, efficient doses of salicylate of sodium and colchicum until the pain and swelling abate. In chronic cases he relies more on regulation of diet, alkaline baths, moderate exercise, and the internal use of bicarbonate of sodium and carbonate and benzoate of lithium. He also speaks favorably of the use of piperazine to the extent of 1 gramme ($15\frac{1}{2}$ grains) per day. E. D. Mapother, of London,¹_{Nov. 3, '94} also speaks favorably of the effects of piperazine in both gout and rheumatism. Both Klemperer and Zeisig¹²⁶_{July 15, '95} and Mendelsohn have tried the use of lysidin in cases of gout, but with no material benefit.

DISEASES OF THE BLOOD AND SPLEEN.

BY THE CENTRAL EDITORIAL STAFF.

SUBMITTED FOR COMMENTATION TO
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DISEASES OF THE BLOOD.

Anæmia.

F. M. Warner, of New York, ⁵⁹_{Feb. 23, '95} discussed the simple anæmia of children, in which condition the proportion of hæmoglobin is diminished to a much greater extent than are the red blood-globules. Chief among the various causes of the condition are malnutrition secondary to graver disorders, improper and scanty food, faulty hygiene, and a condition of uricacidæmia. The author agrees with Rachford that pronounced anæmia without apparent cause is strongly suggestive of concealed tuberculosis. The condition is frequently due to deep-seated and hidden glandular tuberculosis. In the discussion of Warner's paper Mary Putnam Jacobi stated her belief that anæmia in children was nearly always an expression of rickets and of arrested development. It might be compared with the chlorosis of adolescence, since both implied that development was irregular and had not been met by sufficient force of nutrition. The elimination of the process of growth in adults made a very great difference between anæmias occurring at this time of life and in childhood.

Stühlen, of Kiel, ³²⁶_{B. 54, H. 2, 3} made microscopical examinations of the organs in fourteen cases of anæmia, to determine the amount of iron contained in them. In most of the severe cases, especially in typical pernicious anæmia, deposits of iron were found in the liver and spleen, frequently in the kidneys, and sometimes in the bone-marrow. If the disease were, however, dependent upon repeated loss of blood or juices, the organs showed but very slight or no iron reaction. This difference is explained by the fact that, in the severe anæmias, an abnormal destruction, combined with deficient new formation of the red blood-corpuscles, takes place,—*i.e.*, an abnormal amount of iron, set free by the destruction of red

cells, is deposited in the organs, while elimination of the iron normally deposited does not occur, because of the deficient production of erythrocytes; on the other hand, in the anæmia produced by loss of juices, all the iron stored up in the organs is used for regeneration purposes. In a case seen by J. A. Scott, of Dublin, ¹⁶_{Jan., '95} the iron was deposited in the outer zone of the hepatic lobules, while the kidney was free from iron in excess; while in another case the iron was only found in the kidney by the Prussian blue reaction, the liver being free. W. B. Ransom, of Nottingham, ²_{May 4, '95} having found an increased deposit of iron in the liver and kidneys in some cases, and an absence of such increase in others, the primary change appearing to be in the blood-forming organs, regards it as an open question whether increased hæmolysis would account for the symptoms or explain the pathology in all cases.

James Taylor showed before the Royal Medical and Chirurgical Society ¹⁵_{Aug., '95} the spinal cords of two patients with profound anæmia, who had presented symptoms of ataxia during life. In one case there was also a spastic condition of the limbs with loss of control in the sphincters, and in the other subcutaneous and retinal hæmorrhages. There were extensive sclerotic changes in the posterior and lateral tracts, while the gray matter was unaffected. Since Lichtheim, in 1887, first drew attention to the nervous symptoms and spinal-cord changes which may be associated with profound anæmia, Minnich and many other observers have reported numerous cases; so that the connection is now generally acknowledged. In 1891 Putnam recorded eight cases, with four autopsies, of enfeebled persons, past middle life, who presented symptoms of progressive motor and sensory paralyses, proving fatal within two or three years. These probably are allied to the anæmic cases. Sclerosis was found in tracts occupying parts of the posterior and lateral columns, symmetrical on each side, and more marked in the cervical than in the lower regions of the cord. Burr ¹¹²_{Apr., '95} records seven more such cases of profound anæmia, with similar lesions. In some of the cases, although no definite symptoms had been noticed during life, sclerosis was well marked. It is clear that the primary lesions in these cases are multiple, and that each induces a secondary patch of degeneration, but whether they are the sequelæ of numerous small hæmorrhages or are degenerative results following the same toxæmic conditions as those which produce the anæmia has yet to be determined.

Taylor looks upon the cord changes as of double origin: (1) sclerosis resulting from small hæmorrhages similar to those occurring in the retina in the same disease; (2) sclerosis the result of

a blood state. He instances as analogous the posterior sclerosis found by Williamson in cases of diabetes and the sclerosis present in the cord in cases of pellagra.

Burr finds that the localization of the lesion is fairly characteristic and constant. The cervical swelling is always the seat of greatest change and the lesion progressively diminishes in intensity and extent; so that the lumbar cord presents little or no change. The parts affected are the posterior columns, the lateral columns in and near the crossed pyramidal tracts, the direct pyramidal tracts, and rarely a band running forward along the circumference of the cord (the direct cerebellar tracts). The gray matter suffers slightly, if at all. The posterior nerve-roots likewise suffer but little. The lesion is always symmetrical, though sometimes extending a greater distance on the one side than on the other.

In the discussion of Burr's cases, J. Hendrie Lloyd, of Philadelphia, ²⁴²_{Jan., '06} stated that in his own experience he had found the degeneration confined almost entirely to the posterior columns of the cord. Van der Stricht, of Ghent, ³_{Feb. 27, '06} also publishes a detailed study of the condition of the spinal cord in anæmia.

Treatment.—The two drugs which are most efficacious in the treatment of anæmia in young children, according to F. M. Warner, of New York, ⁵⁹_{Feb. 23, '06} are iron and arsenic, which should be given sparingly in tonic doses. In those forms of anæmia which are more or less clearly of intestinal origin, antiseptics should be administered.

The tincture of chloride of iron seems to C. Brown, of Sac City, Ia., ¹⁰⁶_{Nov., '04} to be most effective when it can be borne; while J. H. Fruitnight, of New York, ⁵⁹_{Feb. 23, '06} has found citrate of iron in moderate doses well tolerated. Theoretically, the best preparation, according to George Herschell, ²_{Nov. 24, '04} is the nascent ferrous carbonate formed in the stomach itself by the reaction between sulphate of iron and carbonate of potash, while the worst preparations are the albuminates, peptonates, and colloid forms. In the latter, contact with the hydrochloric acid of the gastric juice produces a precipitate of insoluble ferric carbonate of iron. The alleged fact that these preparations are better borne in disease is evidently due to the fact that they are almost inert. Herschell gives an account of results obtained by administering different forms of iron to sixty-five out-patients at the National Hospital for diseases of the heart; the hæmoglobin was estimated before and after treatment by means of Fleischl's hæmometer. Bland's pills in tabloid form proved the best, in an average daily increase of 1.2 per cent. of hæmoglobin.

Ranieri ¹¹⁶⁷_{No. 4, '94} and Zelenew ⁵³⁰_{No. 2, '96} have had good results from

mercury, and the former recommends it even in cases in which there is no dependence on syphilis.

Savoca¹¹⁴⁷_{May, '06} used zinc sulphate internally in three cases of anæmia with alleged benefit, in daily doses of 0.01 to 0.06 gramme ($\frac{1}{6}$ to 1 grain) at meal-time, in divided doses. There was a rapid increase in the proportion of hæmoglobin in the blood and of the body-weight, and considerable improvement in the general health.

Pernicious Anæmia.

Etiology and Pathology.—Although, since the time of Addison,²⁰¹⁰_{'65} pernicious anæmia has been quite frequently described as idiopathic, Ralph Stockman, of Edinburgh,²_{May 4, '05} expresses the conviction that it is not a disease in itself, but is a high degree of anæmia usually following on numerous remote or predisposing causes, all of them well recognized as tending to produce the anæmic state; that in certain individuals the anæmia induced by these causes tends to bring on degenerative changes in the blood-vessels, which lead, in turn, to the occurrence of numerous capillary hæmorrhages all over the body; and that it is the persistent and long-continued duration of these small internal bleedings, assisted often by larger external ones, which confers on certain cases of anæmia the fatal, or “pernicious,” or “progressive” character of the illness.

[I have for many years maintained that the arguments in favor of the “idiopathic” nature of pernicious anæmia are very faulty.—F. P. H.]

In the cases which have been observed and reported by competent authorities a number of different circumstances seemed to stand in relation to the development of the disease; but it is a noteworthy fact that, whatever the origin, the clinical picture is in all cases identical. In brief, it may be regarded that pernicious anæmia develops in direct or indirect consequence of preceding exhausting conditions. It is always insidious in the beginning and there is at first nothing to distinguish it from ordinary simple anæmia. In accordance with this view, we find that atrophy of the gastric mucous membrane, prolonged diarrhœa with or without intestinal ulceration, severe or prolonged hæmorrhage, fevers, mental shock, chlorosis, habitual poor feeding, especially if accompanied by hæmorrhage from any source, and even malignant tumors, are among the causes which have been witnessed. It is of interest to know, also, that in recent years the presence of intestinal worms, especially the *Bothriocephalus latus* and the *Anchylostoma duodenale*, has been recognized as a cause of pernicious anæmia. The

mode in which tæniæ induce anæmia is still under debate, but the direct observation has been made that the anchylostoma suck blood from the vessels of the intestinal mucous membrane and thus produce what is equivalent to an external hæmorrhage.

The evidence seems to him convincing that pernicious anæmia follows usually on well-recognized debilitating causes. The cause is sometimes, however, obscure, and is not detected, but we are rapidly reducing this unknown territory, and, if it be remembered that only a few years ago all cases of tape-worm anæmia were regarded as "idiopathic," we may hope in the near future to elucidate the hitherto unrecognized causes. Further, he does not think that an hypothetical destruction of red blood-corpuscles by the liver-cells or by a ptomaine or ferment can be considered the cause of the condition, but holds, rather, that anæmia from any cause induces in some persons degenerative changes in the whole vascular system; that these permit the occurrence of numerous minute internal bleedings, more rarely of external ones also, and that a persistent continuance of these leads ultimately to excessive anæmia and death. Continued small losses of blood lead to much more profound anæmia than a single large bleeding, and the patients gradually accustom themselves to get along with less and less hæmoglobin; so that they only apply for medical advice when very severely anæmic. It is no uncommon thing to find a case of chronic anæmia present itself for the first time with 20 per cent. hæmoglobin and 1,000,000 red corpuscles per cubic millimetre, whereas, in a case where he examined the blood two days after an acute hæmorrhage had nearly caused death, he found 60 per cent. hæmoglobin and 3,000,000 red corpuscles. Chronic loss of blood is, therefore, much better borne than acute loss, and goes on to a much higher degree without causing death. In pernicious anæmia the internal hæmorrhages are of the size of a pin-head to a linseed, or may be small or very large ecchymoses, found in every organ of the body. When they occur in the brain they have been known to cause paralysis or paresis, sensory disturbances, twitchings of groups of muscles, epileptiform attacks, loss of sight, smell, or hearing. Such results, however, are uncommon. In some cases after death "hundreds of capillary hæmorrhages may be distributed throughout the brain-substance and give to the wax-pale brain a red, punctated appearance; so that one may justifiably use the comparison of Biermer, and speak of purpura hæmorrhagica of the brain." As these hæmorrhages are small in amount and as the extravasated blood has diminished power of coagulation, they are usually soon removed by absorption. As a rule they create no special or direct symptoms.

Hypertrophy of bone-marrow is usually present in, and has been looked upon as distinctive of, pernicious anæmia, but it may occur in other conditions. This hypertrophy may with considerable probability be looked upon as resulting from nature's effort to make up by excessive activity for the loss of blood. In some cases this hypertrophy does not occur, perhaps for the reason that death occurs before it has time to take place. Stockman believes that in many cases the red marrow is exhausted from overwork, and as age advances there is no doubt that the blood is regenerated with much more difficulty and slowness, and this fact probably explains why most cases of pernicious anæmia develops in middle or advanced age.

Stockman also endeavors to prove that the capillary hæmorrhages satisfactorily account for the symptoms of the affection. Much more profound anæmia is occasioned by numerous and repeated bleedings than by one or more copious hæmorrhages. The latter may cause speedy death, but in the former case the body accustoms itself to the altered conditions and life is prolonged, though under the disadvantages of diminished oxidation and debility. The yellow discoloration of the skin and fat depends upon alterations of the hæmoglobin dissolved in the blood-serum. The blood is generally more yellow than normal, and in one instance Broadbent observed that the blood-serum communicated to his hands a yellow stain which in intensity and difficulty of removal resembled that of nitric acid.

In consequence of the loss of blood and the destruction of red corpuscles and hæmoglobin, an excess of iron accumulates in the liver. A derivative of hæmoglobin—urobilin, or hydrobilirubin—appears in the urine. It may be thought also that loss of blood is the cause of the febrile attacks of pernicious anæmia, for such exacerbations are observed in chlorosis and in animals rendered anæmic by bleeding.

Hunter, Mott, and others have laid great stress on the presence of excess of iron in the liver, and this has been advanced as a proof that the liver-cells actually break down red corpuscles and absorb their iron. But iron, although usually too abundant in the liver in most cases of pernicious anæmia, is also found in great excess in other organs. Thus, Grohe²⁰_{B.22,p.437,'61} describes it as present in the liver, spleen, kidney, pancreas, and surface of brain; Quinke, in the liver, pancreas, and kidney; Mott, in the liver, spleen, pancreas, and kidney. It is also found not only in the liver-cells, but in the hepatic capillaries and connective tissue, as well as in the bone-marrow. Whatever opinion may be held regarding the liver and spleen as possible blood-destroying organs, it is hardly im-

aginable that the surface of the brain or the kidneys have any special function of the kind. The true explanation, in Stockman's opinion, seems rather to be that the hæmoglobin of the numerous minute hæmorrhages becomes altered, and thus liberates in the circulation a large amount of iron-containing pigment. This is deposited in the liver and other organs; if the bleedings be numerous the pigment is taken up by many organs, if few chiefly (but in his experience never exclusively) by the liver, which is a principal storehouse for iron in the body. Sometimes, when the internal bleedings have been very numerous (or perhaps always), the red blood-corpuscles are partly absorbed by the lymphatic vessels, and are found both in them and in the glands.

Feletti, of Catania, ³_{Oct. 30, '95} treated in his service a patient who succumbed to symptoms of progressive pernicious anæmia, and in whose blood the staphylococcus aureus and albus were found during life. Necropsy revealed a profound anæmia of all the organs, with fatty degeneration of the heart and considerable tumefaction of the spleen. There was no abscess. The author insisted upon the importance of the presence of staphylococci in the blood during life, for usually these are found only after death. Senator has found, ¹⁴_{May 26, '95} in the blood of a number of cases, small, mobile bodies staining the same as the red corpuscles, and resembling fragments of hæmatins. They possess amœboid movements and Senator believes that they possess a certain pathognomonic value in the disease.

Anomalous Forms.—The anæmia due to the *Bothriocephalus latus* has been carefully studied by Ossian Schauman, of Helsingfors, ²⁰³³_{'94} in seventy-one cases. This form of the disease is characterized by great pallor of the skin and mucous membranes, an expression of fatigue and moderate fever, though the temperature sometimes exceeds 40° C. (104° F.), and is in proportion to the degree of anæmia. He has observed a subnormal temperature in fatal cases. The bones are often sensitive to pressure and the strength diminished; headache is almost constant, listlessness and vertigo and insomnia frequent; the bulbar conjunctiva is yellow. Retinal hæmorrhage occurs in half the cases when the red cells number 400,000, and in some instances the author observed deafness and contractions of the facial muscles. Respiration is generally normal, though there was hæmoptysis in one of his cases. Palpitation of the heart is frequent, with anæmic murmurs and increased arterial beats, while the pulse varies in frequency. Hæmorrhage of the buccal mucous membrane and gums, anorexia, and dyspepsia are also symptoms, and Schauman believes that the stomach discharges its contents more rapidly than in the normal

state, and that albuminoids are scarcely digested in it. Diarrhœa is frequent, and the eggs of the bothriocephalus may be found in the stools. The quantity of urine is variable, and the author noted indican, urobilin in eight cases, and biliary pigment in one case. The clinical picture, it will thus be seen, closely resembles that of the classical pernicious anæmia.

Examination of the blood in Schauman's cases showed the specific gravity to be greatly diminished and the number of red cells to be altered, varying from 2,150,000 to 395,000 in men and 1,968,000 to 798,000 in women. The disease begins slowly and insidiously, by disturbance of digestion, followed by diarrhœa and constipation. The duration is from one month to ten years, and in the latter case there are periods of relative temporary amelioration. Recovery may be brought about by suitable treatment, but the author has observed that in such cases the hydrochloric acid remains absent from the gastric juice. When death occurs, it does so in coma, with lowered temperature and accelerated pulse.

The anatomical alterations noted are: hæmorrhage of the various organs, serous and mucous membranes; the heart is normal in size, but soft and in a state of fatty degeneration; the aorta is normal, the spleen and liver not hypertrophied. There is no special thinning of the intestine nor glandular atrophy as in pernicious anæmia, and the nematoid parasite is present. The bone-marrow is red and contains red nuclear cells. The eggs of the parasite in the stools are almost pathognomonic, since it is rarely that they are met with in pernicious anæmia due to any other cause. The differential diagnosis must be made between chlorosis and cancer, and there is a possibility of confounding the affection with endocarditis, meningitis, typhoid fever, catarrhal icterus, or diseases of the spinal cord. The prognosis is good when the number of red blood-cells exceeds one million, but it is not entirely unfavorable until they fall to half that number. An organic disease is always to be dreaded as a complication. Treatment naturally consists in bringing about the elimination of the parasite, recovery usually ensuing in from six to eight weeks.

In a case seen by Askanazy¹¹⁴_{B.23, II.5,6} the anæmia was most pronounced, the patient, a man 58 years, old, having been affected with intestinal parasites from the age of 15 years. In spite of all treatment the head of the tænia had never been expelled. On his entrance into the hospital he was given a powerful vermifuge, and among the large number of parasites voided sixty-seven heads of the bothriocephalus were recognized.

In the autopsy of 26 fatal cases observed by C. T. W. Hirsch, of Rewa, Fiji,⁶_{Dec. 1, '94} the noticeable points were general pallor of all

the organs and fatty changes in a large number of them. The heart showed the most marked fatty changes. In many cases the papillary muscles showed the "tabby-cat" *striation*. The liver was invariably large and pigmented. In 7 cases the spleen was swollen and pulpy. In 1 case in which the suprarenals showed changes there were scattered tubercles in the lungs. In all other cases the suprarenals were normal. The stomach was normal in all but 4 cases, in which it was much congested. The intestines in 2 cases showed signs of ulceration. In 18 cases *anchylostoma* were found in the duodenum. The blood-vessels were apparently healthy. In two instances the marrow of the long bones was excessively red and showed irregularly shaped corpuscular elements. C. W. Daniels, of British Guiana, ^{Jan. 19, '96} who spent three years in the district just mentioned, states that he found, without exception, numerous *anchylostoma* in 50 cases examined post-mortem, and associated with them the changes described by Hirsch. Since leaving Fiji he has been pathologist to the Public Hospital, Georgetown, British Guiana, and, in the course of some fourteen hundred post-mortem examinations and numerous clinical observations, has had the opportunity of studying the changes associated with the presence of the *anchylostoma*. He finds them, in most respects, identical with the so-called pernicious anæmia. The blood is thin and has little tendency to coagulate, the red corpuscles are reduced in number (frequently less than 18 per cent. of normal), whilst the hæmoglobin is only proportionately reduced; and the organs—in particular, the heart, kidneys, and the liver—are in an extreme state of fatty degeneration. In marked contrast with the latter is the highly-colored bile; there is almost invariably a deposit of hæmatoidin in the hepatic—and frequently in the renal—cells, with occasionally colorless granules, which give the iron reaction with acid ferrocyanide. The only difference noted is the absence of other than intestinal hæmorrhages.

Douglas Stanley read a paper, ^{Feb. 16, '96} before the Midland Medical Society, on a form of disease frequently called *splenic anæmia*,—a term likely to cause confusion. The cases were characterized by a marked reduction in the number of red blood-corpuscles, the white being unaltered, or else also reduced. Poikilocytes and even poikiloblasts were frequently present, the hæmoglobin was also reduced, the spleen greatly increased in size, and the liver frequently enlarged. There was no affection of the lymph-glands. Marked asthenia, passing into marasmus, was observed, and in some cases there was pigmentation of the skin, which might occur in local patches. The duration of the disease might extend over many years, and during its course there were acute attacks, during

which the patient was greatly prostrated, might become of a yellow-olive color, and the temperature might rise to 105° F. (40.6° C.). During such an attack the urine was of a dark brown-red color and contained large quantities of pathological urobilin. When the attack passed off there was a slow restoration to the former condition. The pathological basis seemed to consist in severe hæmolysis, probably due to the absorption of products from the intestines. Post-mortem sclerosis of the spleen and pancreas was found, with marked changes in the suprarenals. The prognosis was always bad, although the duration might be long.

Treatment.—In the treatment of pernicious anæmia Ralph Stockman, of Edinburgh, ²_{May 18, '05} lays stress on the importance of discovering the exciting cause in each individual case. A great drawback to success is the fact that patients are often in an advanced stage of anæmia and debility before applying for advice. Stockman believes that it is always advisable to give iron in the form of a non-irritant preparation, and thinks the reason why it so often proves inefficient is that, owing to the frequent hæmorrhages, blood-manufacture does not keep pace with blood-loss. Arsenic and phosphorus, especially the former, are sometimes of service. The mode of action of both is little understood, but neither of them can replace iron in the blood-corpuscles, and hence, as they both have a powerfully-stimulant and alterative effect on bone, it is probably not far from correct to assume that they may stimulate the bone-marrow and thus increase the number of blood-corpuscles produced by it.

Referring to bone-marrow introduced by Fraser, ²_{June 2, '94} and the use of which in his hands and those of Barrs, ²_{Feb. 16, '95} Danforth, ¹⁰⁸⁰_{V. 4, '94} and others produced results which excelled those of any other method of treatment, Stockman saw no advantage from it in one case, and, from the small amount of iron contained even in red marrow, he concludes that any benefit which it may produce cannot be due to that element.

J. S. Billings, Jr., of Baltimore, ⁷⁶⁴_{Nov., '94} who tried the remedy without success in two cases of pernicious anæmia, says that it is difficult to understand how this remedy could be of service in cases of pernicious anæmia. Its effects can hardly be considered as analogous to those produced by thyroid extract in myxœdema. In the latter case there is atrophy of the gland, giving rise to defective secretion; so that there is an indication for attempting to supply this defect by the administration of thyroid extract. But the marrow in pernicious anæmia is, if anything, in a state of hypertrophy, and the condition is far more analogous to that of the hypertrophied and supposedly overactive thyroid gland in

exophthalmic goitre than to that of the atrophied gland in myx-œdema. Besides, there is no proof whatever that the marrow acts as a gland in the ordinary sense of the word. The formation of red blood-corpuscles by the bone-marrow cannot be properly termed a secretion, it being rather a process of cell-multiplication and development, and there is no proof that this process is influenced in any way by any chemical product of the marrow itself.

W. B. Drummond, of Argyle, ²_{May 18, '95} reports a case in which apparent improvement followed the use of bone-marrow, though the patient died of œdema of the lungs after a sharp attack of tonsillitis; and a similar instance is recorded by McCall Anderson, of Glasgow, ²¹³_{June, '95} the patient dying from an intercurrent attack of influenza, with pneumonia, just as the full benefit of a treatment by bone-marrow and arsenic was beginning to be appreciated. A successful case is described by A. A. Lendon, of Adelaide, ¹¹⁸⁷_{Aug., '95} after a month's treatment.

Riva-Rocci, of Turin, ³_{Oct. 30, '95} from his experience for the past six years, expresses the belief that the injection of iron salts, while improving and even sometimes curing anæmic conditions, do not combat the cause of the anæmia, and that this fact explains the frequent recurrence of the disease. It would appear, from numerous researches, that iron introduced by injections remains in the organism as an assimilable substance. Dynamically iron produces hyperæmia in various organs and tissues, favoring the resorption of œdema in anæmic patients, the destruction of old red corpuscles, and the formation of new hæmatins. He places in the first rank preparations of ferric citrate of ammonium in 0.20- to 1-per-cent. solution, in doses of 0.05 to 0.30 gramme ($\frac{7}{8}$ to $4\frac{1}{2}$ grains). The administration of this drug sometimes causes nausea, vomiting, sneezing, and fever, but it is always possible to avoid local reaction.

Chlorosis.

Stieda, ³⁹³_{B. 32, H. 1, '95} having had twenty-three cases under his care for over a year, made careful examinations of their history and physical condition, and concludes that true chlorosis, not to be traced to external injury or to a primary disease, is a disorder of development, like any other such disorder or sign of physical degeneracy. It is very frequently associated with infantile types of structure in the adult patient, especially ill-developed pelvis, labia, uterus, pudendal hair, and breasts. E. Meinert ⁴⁰⁴_{Jan., '95} believes that the disease must be attributed largely to abnormal positions of the abdominal organs, as gastropptosis and enteroptosis, in which the corset plays a prominent rôle.

Clément, of Lyon, ⁷³Nov. 17, '94; ¹²¹Feb., '95 has always found hypertrophy of the spleen, which only disappeared when the chlorosis was cured. From this it might be argued that chlorosis was of infectious origin. Furthermore, the fever observed in chlorotic patients, the phlegmasia alba dolens, the boarding-school epidemics, and the mild pericarditis with murmurs or friction-sounds also accord with the theory of infection. The hypothesis is well argued, but demands confirmation. Lemoine, of Lille, observed, in the discussion, that he had examined the blood of chlorotic patients for micro-organisms, and in ten or twelve cases had found either the streptococcus albus or the staphylococcus albus, the former being the more abundant, and, in rarer instances, the bacillus coli.

E. Guani ⁴⁹⁷Dec., '94 does not admit a febrile type of chlorosis, but asserts that a certain degree of apyrexia accompanies true chlorosis. Hence, when fever is present, it must be attributed to some concomitant morbid state, as constipation or tuberculosis.

F. Müller, of Marburg, ⁴Sept. 23, '95 referring to percussion of the organs of the chest in chlorosis, states that chlorotic subjects often present a high position of the diaphragm. The liver-dullness begins at the upper edge of the fourth or the lower edge of the third rib. The heart-dullness is sometimes found to extend either to the right or to the left. This enlargement of the area of the heart-dullness is probably due in but a few cases to dilatation. Frequently it is of a certainty due to the elevated position of the diaphragm, in consequence of the diminished volume of the lungs.

Treatment.—Shall we give iron in chlorosis? This was the subject of a warm discussion before the Munich Congress of German Physicians. ¹¹⁵³Apr. 10, '95 Bunge, the physiologist, in the opening paper, expressed himself as against its administration, while Quincke, no less eminent as a clinician, pronounced himself as a partisan of iron. Bunge maintained that most natural foods contain an organic, absorbable, assimilable combination—hæmatogen—which may be utilized by the economy in the formation of hæmoglobin, being separated into iron and peptone by the digestive secretions. Pharmaceutical preparations of iron not being assimilable and being eliminated almost entire in the fæcal discharges, Bunge asks why a patient should be sent to the druggist instead of to market. As for the assertion that the food does not contain a sufficient quantity of iron, he disproves it by the following calculation: A man has, in the 5 litres (quarts) of blood contained in his body, 500 grammes (16 ounces) of hæmoglobin, or 1.70 grammes (26½ grains) of iron; 1 kilogramme (2½ pounds) of beef contains 0.04 gramme (⅔ grain) of iron. Now, no matter how

anæmic he may be, he never loses more than one-third of the hæmoglobin in his blood, and this he can replace by using 15 kilogrammes (33 pounds) of meat per month; while, by using 500 grammes (16 ounces) of meat and 200 grammes ($6\frac{1}{2}$ ounces) of lentils (vegetables) daily for a month, two-thirds of the total quantity of iron in the blood may be made up. The good effects observed by the use of iron as a drug he was inclined to ascribe either to suggestion or to modifications in the diet.

To all these objections a victorious response was given by Quincke and the other clinicians taking part in the discussion. Quincke first stated that the researches of physiologists are not comparable to those of practitioners, since the first experiment upon the animal or upon the healthy organism with perfect hæmatological equilibrium, while the second do so at the bedside and upon an anæmic organism. This fact explains the continual contradiction between laboratory and clinic. Daily practice has demonstrated that iron is a true specific in chlorosis, the drug being absorbed and deposited in the liver, spleen, and bony marrow, to be utilized when needed by the economy. But all preparations do not act in the same manner. Quincke divides them into five groups: (1) the ferrocyanides, which have no action; (2) the blood from an organism of the same species, which may be useful during a certain period; (3) hæmoglobin in solution, which probably penetrates rapidly into the circulation and is assimilated; (4) the ferruginous salts of vegetable acids, which, at least by subcutaneous injection, are taken up by the circulation and deposited in the liver; (5) insoluble preparations and ferric-oxide salts, which dissolve in the stomach and later form albuminates and absorbable iron. Bland's pills and acid lactate of iron have seemed to be the most active in chlorosis. A daily dose of 0.05 to 0.10 gramme ($\frac{3}{8}$ to $1\frac{3}{4}$ grains) is sufficient. For hypodermatic injection a 5-per-cent. solution of ferric citrate may be used, a quantity containing from 0.5 to 0.10 gramme ($\frac{3}{8}$ to $1\frac{3}{4}$ grains) being injected daily.

In the discussion following these two reports the propositions of Bunge were completely overthrown. Stifter maintains that the iron found in totality in the fæces may have been utilized, if only as a stimulant, by the organism before elimination. Immermann observed that chlorosis developed in persons using meat, and hence that chlorosis was an affection of the organs of hæmatopoiesis, the functions of which were improved by the pharmaceutical preparations of iron. In one way or another the increase of hæmatins and the ratio of hæmoglobin due to diet alone cease in about eight days, and only go on continuously when the patient

combines diet with iron. This fact, which is a refutation of Bunge's theory, has been demonstrated by Reinert and by von Ziemssen, who, in common with Baumler, does not hesitate to give iron to chlorotic patients suffering from gastric catarrh. Edlefsen gives diluted hydrochloric acid in these cases, 5 drops before meals, and it has seemed to him that the iron was particularly well supported in such instances. Both he and Nothnagel regarded repose in bed as the most valuable adjuvant to the iron treatment, acting better than a sojourn in the mountains or at the sea-side.

In a comprehensive clinical lecture on the subject of chlorosis and its treatment, Potain, of Paris, ²⁴_{Aug. 14, '95} ¹⁵_{Aug.} states that when the aortic valves are affected it must be remembered that chlorosis, though a troublesome complication, does not aggravate the malady. Mitral regurgitation, on the other hand, tends to be exaggerated by a chlorotic condition. In these cases iron not only augments the number of red corpuscles, but, as observed by the author, will lead to a greater capillary resistance and, consequently, to an improved circulation.

According to Hayem, ¹⁴_{Apr. 21, '95} rest in bed, when sufficiently prolonged, is of the greatest importance, checking the too rapid destruction of the red globules. The choice of food is made subordinate on account of the dyspepsia which generally accompanies chlorosis. There is often an hyperpepsia of medium degree and some dilatation. In such cases the food at first should consist of milk and raw meat; later on, of underdone eggs, the easily-digested varieties of fish, *purée* of green vegetables, and stewed fruit. No bread is allowed for four or five weeks. In about 20 per cent. of the cases the gastropathic state is more pronounced and needs more care. Sometimes there is intense parenchymatous gastritis, with marked dilatation; again, there may be a gastritis which has caused diminished glandular secretion and an hypopeptic state. In the former case, in addition to restricted diet, massage is to be used, and lavage also, when abnormal fermentation exists. By the use of these measures it is generally possible to begin ferruginous treatment in from two to four weeks. In hypopeptic conditions, however, iron (either Blaud's pills or the protoxolate) may be used from the first before meals and hydrochloric acid a half-hour after eating.

Henri Huchard, ³⁵_{Jan. 19, '95} directs that milk shall be used, or, if this is badly borne, pure water or a hot, weak infusion of tea (hot drinks excite the gastric secretion), eggs, *purée* of vegetables, lean fish, fowl, and cooked fruits. One-half hour before the meal a small dose of an alkali, as sodium bicarbonate, 0.50 gramme ($7\frac{1}{2}$

grains), should be prescribed for the purpose of exciting the flow of gastric juice. At the same interval after it a Madeira glass of hydrochloric acid in solution in water, 1 to 250. The hydrochloric may be replaced by lactic acid, 1 or 2 grammes (15 or 30 grains) after meals. It is necessary to forbid the use of wines, cinchona-wine, strong beers, alcoholic drinks, and stimulating food. If there are gaseous formations, lavage, either of pure water or water containing salicylic acid, 1 per 1000, is indicated. After two to four weeks of this treatment the use of the preparations of iron can be begun. A case of chlorosis was successfully treated by C. Forbes, of West Africa, ²_{Dec. 8, '04} by means of bone-marrow.

In a paper read before the Kentucky State Medical Society, ¹¹²_{Aug., '05} F. P. Henry, of Philadelphia, discussed the etiology, anatomical characters, and treatment of chlorosis.

Hæmophilia.

R. Kolster ⁵⁸⁶_{No. 28, '05} states that the disease occurred in eighteen cases in fifty families observed by Nasse's law (transmission of hæmophilia by women not themselves affected), and in sixteen other cases by the same law, but with some exceptions; and in the twelve last cases it showed itself without regard to Nasse's law. In a case of his own the patient had had purpura following a severe fever, and an uncle also had hæmophilia. At the age of 1 year the child of this patient was attacked, without any known cause, with multiple hæmorrhages of the genital organs, intestine, mouth, and nose, and finally with purpura hæmorrhagica.

In a case reported by Judson Daland, of Philadelphia, ⁹⁹_{Mar. 14, '05} the family history showed no hæmophilia on either the father's or mother's side as far back as the fourth generation. Of their five children, however, the second at 3½ years developed hydrocephalus and suffered from frequent severe and uncontrollable hæmorrhages from the nose, of which he finally died. The third child showed no evidence of hæmophilia, but died of malignant scarlet fever at 2 years of age. The fourth child had severe hæmorrhage when he began cutting teeth, and at the eruption of the molars he bled to death. The occurrence of these three cases in brothers and the fact that no hereditary tendency to the affection could be traced make Daland's cases a peculiarly interesting contribution to our knowledge of the subject.

In the discussion F. P. Henry stated that isolated cases such as those described by Daland and Robinson were rare, and that it was generally possible to demonstrate the hereditary character of

this affection, which is in reality the most hereditary of all diseases. There is in Switzerland a family of which the history has been traced for about three hundred years, and during this period there have been bleeders among the male descendants. The females, as a rule, remain exempt, the disease being transmitted through them to their male children. They are not necessarily exempt. Virchow believes that one woman may be affected to seven men in families of bleeders.

There are certain peculiarities about families of bleeders, and one is their fecundity. The decimation in numbers caused by fatal hæmorrhages is made up, to a certain extent, by the fecundity of the females. The cause of the affection, he believed, was to be found in the blood-vessels rather than in the blood itself, notwithstanding the fact that the treatment which has been found most satisfactory—transfusion of “entire” or defibrinated blood—rather contradicts that assertion. Microscopical changes have, however, been found in the arterioles, consisting mainly in wasting or absence of the middle muscular tunic of the vessel. Vasomotor influences undoubtedly play their part in bringing about an attack. This is shown by the flushing of the face, which so often precedes an attack, and also by the fact that the attack may follow emotional excitement.

C. G. Kuhlman, of San Francisco,¹⁴⁷_{Dec., '94} also states that this inherited or acquired tendency to severe and often uncontrollable bleeding upon slight provocation must be regarded as an abnormal pathological condition on the part of the tissues entering into the composition of the blood-vessels, but the blood itself was also diseased. With rare exceptions, this hæmorrhage takes place from the arterial system. The histological elements of which the arterial tunics are composed undergo certain changes, impairing or totally destroying their anatomical and physiological processes. These changes are: Granulation necrosis occurring in tuberculosis, syphilis, leprosy, etc., and due to direct chemical changes between the physiological products of certain organisms and the protoplasm of the histological elements; amylosis occurring during extensive suppuration processes, and due to a similar direct change; coagulation necrosis or mucoid degeneration observed in cancerous and diphtheritic processes; liquefaction necrosis occurring in typhus, variola, etc.; fatty and calcareous degeneration in which the protoplasm is replaced by fatty granules and crystals of carbonate and phosphate of lime. The precise etiological factors concerned in the production of these changes are as yet *sub judice*. The blood also belongs to the mesoblastic tissues, and during this morbid process undergoes changes that impair or destroy its

capacity for coagulation. The hæmorrhagic diathesis, then, is not a mysterious condition of the blood induced by some unknown cause, but rather a very important symptom pointing to a grave condition of an arterial or venous trunk or of the whole vascular system.

R. Kolster ⁵⁸⁶_{No. 28, '96} states that pregnancy and labor do not present the danger for an hæmophilic woman that might be supposed. Of one hundred and thirty cases, the death of the mother occurred only in three and abortion in only sixteen cases.

A case of hæmophilia described by J. W. White, ⁶_{Sept. 9, '94} of Glasgow, demonstrates the risk of extraction of teeth under such circumstances. In the present instance the fangs were short, being in part absorbed, and bleeding under normal circumstances should have been but slight. The subject has also been treated by W. Clark, of Cleveland, ²²²_{Oct., '96} and W. O'Neill, of Lincoln. ⁶_{Aug. 31, '96}

Zenoni, of Turin, ²⁰_{Jan. 4, '96} states that Bizzozero, Rieder, and others have noticed the appearance of nucleated red corpuscles in the blood after considerable or repeated hæmorrhage. These corpuscles were usually noticed some days only after the occurrence of the hæmorrhage, but Zenoni, in consequence of his experiments, places their appearance much earlier. He believes that this early appearance is due to the mechanical effect produced by the withdrawal of blood, for after repeated bleedings they appear too soon for their re-appearance to be due to an hæmatopoietic reaction; moreover, eight or nine days afterward they are no longer noticed, exactly when the hæmatopoietic reaction is at its maximum. He further thinks that after loss of blood these corpuscles are mechanically drawn into the circulation from their normal site,—the bone-marrow; that a certain number of them get stopped in the spleen, proliferate there, and give to the spleen that fatal hæmatopoietic function which has been ascribed to it by Bizzozero as taking place after hæmorrhages.

Treatment in Hæmorrhage.—In a case of apparently hopeless hæmophilia seen by James W. Barrett, of Melbourne, ²⁸⁵_{Aug. 29, '96} local styptics were discontinued and liquor calcis chloridi (15 minims—1 cubic centimetre) was administered for two hours. After this there was no more hæmorrhage. A pad placed on the wound was removed on the thirteenth day, and a clot was found firmly wedged into the aperture. The child was rapidly gaining in strength. From the thirteenth to the twenty-third day there was no oozing, and the dose was reduced to 10 minims (0.65 cubic centimetre) three times a day. On the twenty-sixth day the pad was removed and the case was practically at an end. The parents stated that the child, who had been allowed to get up and who

had fallen a few days before and struck his head, had shown little or no bruising, but that before the illness he would have turned perfectly black in consequence of such an injury. There is no history of hæmophilia in the family.

Transfusion.—Von Ziemssen³⁴_{Apr. 2, '96}; ⁹⁹_{May 23} calls attention to the fact that in spite of simplification of method, and in spite of the considerable number of cases which he had been able to report of the curative effect of repeated transfusions of blood in the same individual, the method of infusion of salt solution is given almost uniform preference in surgical practice, and blood-transfusion considered of but little value in comparison. The reason for this is evident,—namely, that in the majority of the surgical and obstetrical emergencies in which either infusion or transfusion must be employed the infusion of salt solution gives a simpler and more rapid means of restoring the lost bulk of fluid in the vessels, and is, therefore, far preferable to the more complicated operation of blood-transfusion. On the other hand, the effect of salt infusion is only transitory at the best, and it becomes necessary, according to von Ziemssen, in most cases, to follow it, sooner or later, by an infusion of blood.

The indications for choosing one or the other method are usually plain. For instance, in the acute anæmia resulting from sudden and profuse hæmorrhage, salt infusion is to be chosen. In anæmia resulting from disease of the blood-making organs, on the other hand, in which the percentage of hæmoglobin and the number of red blood-corpuscles fall even below that which results from sudden and profuse hæmorrhage, no one would think of resorting to salt infusion. In simple anæmia resulting from profuse hæmorrhage in a healthy patient the restoration of the normal condition of the blood is immediately begun and carried on by the blood-making organs; in pernicious anæmia, etc., the blood-making organs are so diseased as to be incapable of effecting repair of the blood-tissue.

In case of frequently-repeated hæmorrhage from internal organs, as in typhoid, ulcers of the stomach, etc, salt infusion, although it momentarily restores the heart's activity, leaves much to be desired on account of the fleeting nature of its effects. It is in such cases as these that von Ziemssen recommends transfusion of blood.

Ewald⁴¹_{Oct. 24, '96} showed to the Berlin Medical Society, October 16, 1895, a case of immediately successful transfusion of blood in a man of 32 years, who had just arrived in Berlin from New York. Even during the voyage serious symptoms of weakness and anæmia had been present, and these, on his arrival, became much worse.

The patient was already somnolent and pulseless. He was taken to a sanatorium, where, in spite of injections of camphor, etc., he became still worse. As a last resource about 100 grammes ($3\frac{1}{4}$ ounces) of blood were taken from the patient's wife, freed from fibrin by whipping in a sterilized glass vessel, taken up into a syringe and injected into the arm, the vein of which had already been prepared. The action was visible to the eye. The condition improved daily, and later examination of the blood showed that the case was one of progressive pernicious anæmia, the end of which would have been fatal but for the timely transfusion of blood.

Infusion of Saline Solutions.—Nathan Raw, of Dundee, ⁶_{Aug. 17, '95} has employed infusion in a number of cases where hæmorrhage threatened to be fatal, with good results. His method is as follows: An incision two inches long is made obliquely in the line of the vein, which is tied with a single loop of catgut at its lower end, a loose ligature being placed at the upper end of the vein. Between the ligatures the vein is opened, and a small, straight glass cannula is introduced. To this are attached two yards of small rubber tubing with a small glass funnel holding four ounces. The cannula is securely tied in the vein, and then all is ready. The greatest care must previously have been taken to exclude all air from the tubing and cannula by filling them with the solution. The solution is prepared by adding 1 drachm (4 grammes) of chloride of sodium to each pint (500 grammes) of carefully sterilized water heated to 100° F. (37.8° C.). The fluid is poured in slowly and the limb raised to allow it to flow more easily. In this way several pints may readily be introduced. After sufficient has been given the vein is tied above and below, the skin sutured, and the wound dressed antiseptically. He has often left the cannula in the vein so as to allow more fluid to be injected on different occasions at short intervals. The only danger to the patient is from the introduction of air; but with care this can always be avoided.

The value, in the treatment of severe hæmorrhage, of infusion of normal saline solution, is demonstrated in a paper by J. H. R. Glenn, of Dublin, ²²_{May 8, '95} Charles McBurney ⁹⁶_{Aug. '95} reported to the New York Surgical Society a case of suppression of urine after operation, successfully treated by saline infusion. In the discussion of this case that followed, reference was made to a case of total suppression of urine after an operation for gangrenous hernia, in which striking improvement had followed similar treatment. It was also called to mind that Howship Dickinson had previously called attention to the fact that patients could be aroused from diabetic coma in a few minutes by saline infusion.

Leucocythæmia.

Lannois and Regaud⁴⁵⁷_{No.2,'95} observed a case of true leucocythæmia associated with cancer in a female, aged 58 years, who, for the three preceding years, had had some glandular enlargement, and for two years had had uterine symptoms. Physical examination showed an epithelioma of the cervix uteri and very marked general glandular enlargement, accompanied by enlargement of the liver and spleen. Examination of the blood showed a proportion of one white to twenty-five red corpuscles, the white corpuscles being chiefly of the small mononuclear variety. The patient gradually sank and died with fever about six weeks after admission to hospital. The autopsy showed general enlargement of the lymph-glands, with enlarged liver and spleen and carcinoma uteri. The histological examination of the glands showed simple hyperplasia and no signs of carcinoma; the liver and spleen showed the changes usually associated with leukæmia. The uterus showed carcinoma of the alveolar type. Bacteriological examination revealed a general streptococcal infection, the organism having penetrated even into the lymph-glands, though the authors regard this as secondary, and do not claim any connection between the infection and the blood-changes. E. Bitot, of Bordeaux,¹¹⁸_{Oct., '95} records a fatal case of splenic leucocythæmia in a child of 9 months, the spleen being found to weigh 225 grammes (7½ ounces).

A case of leucocythæmia cured by bone-marrow is recorded by W. G. Bigger.⁶_{Sept.22,'04} The patient was a lad, aged 12 years, who for the previous six years had been under observation, suffering from splenic enlargement with anæmic symptoms, but who had previously been much relieved by treatment with arsenic and iron. Two months prior to report the disease acquired a more active character. The spleen became much larger, and completely filled the left half of the abdomen, while at the same time there were diarrhœa, pyrexia, and frequent attacks of epistaxis. He was then fed on raw bone-marrow spread on thin slices of bread. Under this treatment improvement, after the first week, was marvellous. The spleen diminished in size and the anæmia rapidly decreased. After a month's treatment the boy was reported as being better than ever before, while the spleen had receded and was at that time only felt about three inches below the ribs. Similar success attended a case treated by Macpherson Lawrie, of Weymouth.²_{Dec.1,'04}

Acute Leukæmia.

Since Ebstein, of Göttingen, in 1889, gave the first description of acute leukæmia from cases recorded in medical literature,

numerous observations have been added. Fraenkel⁴_{Sept. 26, '95} has observed nine in his own experience and Leyden another. As all these were carefully studied, Fraenkel's remarks on the subject are not without interest. According to him, the disease attacks adolescents and young people as a general rule, 4 out of the 10 cases being between the ages of 13 and 18 years and 6 between 24 and 34 years; 4 were of the feminine sex and 6 of the masculine. The disease lasted from fourteen days to four months and was always fatal. It usually begins by prostration, petechiæ, and hæmorrhage of the mucous membranes, and Fraenkel several times observed retinal hæmorrhage. In 2 cases there were cerebral hæmorrhages. Some time afterward symptoms showing involvement of the hæmatopoietic organs appeared, as swelling of the lymphatic glands and the spleen. Twice the disease followed influenza and in 1 case a syphilitic lobulated liver was found at autopsy.

In a case studied by Hintze³²⁶_{B. 53, H. 3, 4} examination of the blood showed a marked increase in the number of white corpuscles, leucocytes with a large, round nucleus and a small margin of protoplasm predominating. Eosinophile cells were present in small numbers. Micro-organisms were visible in strikingly large numbers, partly arranged in small groups and partly in chains; so that there was some doubt as to whether they were staphylococci or streptococci. The enlargement of both liver and spleen progressively increased. In the lungs, liver, kidneys, spleen, bronchial and mesenteric glands, as well as the pancreas, cocci were observed morphologically like those found during life in the blood. The case is believed to have been one of acute leukæmia of lienalsplenic-myelogenous type. Although an etiological influence is ascribed to the micro-organisms found both in the blood and in the various viscera, these are not considered specific; and the view is expressed that various micro-organisms, as well as various toxic agents, may give rise to the clinical picture of leukæmia. In this way there may be an interrelation between infectious diseases attended with acute, transient leucocytosis; chronic infectious diseases attended with leucocytosis of longer duration and destruction of red blood-corpuscles; acute leukæmia,—that is, febrile diseases with leucocytosis and glandular enlargement; chronic leukæmia, with acidophile and neutrophile cell-granulation; universal lymphosarcomatosis, with acidophile and neutrophile cell-granulation leucocytosis; and universal lymphosarcomatosis without cell-granulation and leucocytosis (so-called pseudoleukæmia).

In a study of acute leukæmia and its relations with ulcers of the digestive tube, Askanazy²⁰_{B. 137, H. 1} carefully describes the case of

a woman, of 37 years, attacked with acute leukæmia leading to death within two months. The principal anatomical alterations noted were a slight enlargement of the spleen, not remarked during life, and karyokinetic changes in the white corpuscles of the blood. In spite of this fact, however, the number of mitoses did not warrant the supposition that proliferation of the white cells had led to the formation of the enormous number of leucocytes characterizing leukæmia. The marrow of the long bones (humerus), instead of being fatty, was red and presented lymphoid characteristics, there being thus an hyperplasic multiplication of the medullary elements, which, in dividing, led to the production of a considerable number of white corpuscles. The red marrow of the ribs was also characterized by the small number of nucleated red corpuscles. These two facts seem to indicate that the bone-marrow not only returned to an embryonic stage, but also that the young lymph-cells were incapable of the evolution necessary to transform them into red corpuscles. The mucous membrane of the digestive tract was the seat of lymphoid infiltration, accompanied by ulcerations of the gums, pharynx, and large intestine. Most careful search failed to reveal any microbes; and it is, therefore, impossible to ascribe leukæmia to micro-organisms playing the rôle of infectious agents.

R. C. Cabot, of Boston, ⁹⁹_{Nov. 22, '04} in an attempt to answer the question whether it is reasonably certain that cases of acute leukæmia have occurred, states that in order to make a diagnosis of acute leukæmia we need to establish (1) the previously normal condition of the blood; (2) the presence in the blood of such numbers *and varieties* of white cells as occur, so far as is known, only in leukæmia; (3) a reasonably short course to the symptoms. The negative results arrived at are: (1) increase in the white cells (even very large) does not constitute the disease leukæmia, even when accompanied by enlargement of the spleen and lymph-glands; (2) the acute onset of severe general symptoms is of no value as an indication of the beginning of a case of leukæmia, for such is often seen in course of a case of chronic leukæmia; (3) there are no post-mortem appearances, and no physical signs (exclusive of the blood examination) peculiar to leukæmia, acute or chronic.

On examining the literature of acute leukæmia with special attention, first, to the nature of the evidence submitted for their being acute, and, second, of their being leukæmic, he shows by a table that, out of the thirty-four cases reported, only three comply with the requirements. He concludes that if what he has been maintaining is true—namely, that there are only two or

three satisfactory cases of acute leukæmia in literature—it is very important that any one who has seen such cases should report them at once, so that the foundations on which our ideas of the disease are built may be strengthened. Cases of acute leukæmia are described by Seelig³²⁶_{B.54,H.6} and Benda.³_{June 19,'05}

Chronic Leukæmia.

Hindenburg³²⁶_{B.54,H.2,3; Aug.,'05} suggests the following theoretical pathology of leukæmia, based upon the examination of three cases. The mitotic increase of a certain kind of leucocytes goes on in leukæmia in a pathological manner as the result of a cause as yet unknown. Usually the myelocytes are involved; sometimes other varieties of leucocytes. The cause of this predilection is quite unknown. Indirect division of the leucocytes affected takes place in the lymphoid organs, especially in the capillaries of the liver and in lymphatic new growths, and in many cases in the greater circulation. The germinal centres take part in the increase only in lymphatic leukæmia. Different localizations of the leukæmic process seem to depend on the fact that various kinds of leucocytes show a preference for certain parts of the lymphatic apparatus. The newly-formed cells enter the blood partly by way of the lymph-channel, partly directly, as in the spleen and bone-marrow. Entering the circulation and increasing there, to some extent, the leukæmic blood is the result.

Matthes⁴_{No.22,'04} analyzed the blood in two cases of leukæmia, and found that neither contained true peptone, but that in both the blood as well as the serum contained a deutero-albumose. In one case the serum contained, besides, an abundance of dissolved nucleo-albumin, arising from the destruction of the blood-corpuscles. There was but a slight increase in the excretion of uric acid in both cases. Gumprecht⁴_{No.43,'04} in four cases found elements in the lymphatic organs which were not found in the blood, and he therefore concludes that leukæmia is a disease of organs. In the discussion of this paper Pick stated that he had observed a case of myelogenic leukæmia in which the erythrocytes of the blood presented numerous mitoses.

From the analysis of six hundred cases Vehsemeyer⁵⁷_{Nov.25,'04} concludes that all the factors so far indicated as efficient are in reality only predisposing causes, and that the point of departure of the disease is in the digestive tract, there being an auto-intoxication by toxic albuminoids.

Tschistovitsch has described a special variety of "transparent polynuclear" leucocytes, which he has observed in the blood of healthy patients and of those suffering from chronic osteomyelitis,

in the proportion of 0.5 to 0.6 per cent. Georgievski⁸⁵⁹ observed a patient of 50 years, suffering for some months from leukæmia, without pathological antecedents, in whom the number of this variety of leucocyte was increased to a remarkable degree. What was particularly noticeable was the polymorphism of the leucocytes, stated by Rieder to be quite characteristic of leukæmia; the bone-marrow cells, which, according to Ehrlich, are peculiar to myelogenic leukæmia, were especially numerous, the transparent polynuclear cells coming next in order, their dimensions being about the same as polynuclear neutrophiles. The number of nuclei varied from two to seven and were arranged in the middle of protoplasm, either alone or together; these nuclei, besides, resembled exactly those of the polynuclear neutrophiles, and also showed a brilliant ring at the periphery. Their protoplasm, with distinct outlines, was highly refractive and contained grains which could not be fixed by stains.

Churton, of Leeds, ²Nov.2,'95 reports a case of splenic leukæmia following a blow on the abdomen, and Lion, of Paris, ¹⁴Jan.23,'95 a case of leukæmia transformed into lymphadenoma. Cases are also recorded by A. Lutz, of Munich ³⁴No.29,'95; V. A. Latham, of Chicago ⁶¹Jan.26,'95; and E. H. Tinen, of Chicago. ⁶¹Jan.26,'95

A. Kast ¹¹⁴B.2,H.1,2; ⁸¹⁴Oct.1,'95 reports a case of leukæmic priapism occurring in the initial stage of leukæmia, in a man aged 42. It persisted for two months, and disappeared only with the cessation of all sexual excitement. At the autopsy the central part of the corpora cavernosa penis was found to consist of an homogeneous connective tissue, containing few small spaces, which had probably been formed from white thrombi.

Another case was one of bulbar paralysis in a leukæmic patient, aged 50, in whom there existed right-sided total facial paralysis, total acoustic paralysis, and, later, left-sided facial paralysis. No further bulbous symptoms were manifested up to the time of death. The anatomical examination showed changes in the medulla oblongata, in the neighborhood of the olivary body, extending over the whole transverse section, consisting of diminution and swelling of the medullated fibres as well as diminution and shrinking of the ganglion-cells and strong granulation of their protoplasm,—alterations in extent such as the clinical picture would hardly lead one to expect.

Scurvy.

Testi and Beri ⁵⁰⁵Aug.10,'95; ²Sept.2 obtained from a piece of scorbutic gum a micro-organism which they believe to be the cause of scurvy. The microbe stains in all the aniline dyes, resists Gram's stain,

is perfectly round, and is generally united with one or more of its kind. Its culture renders gelatin fluid and gives rise to a sawdust-like deposit. Inoculation of these cultures into guinea-pigs and rabbits gave rise to fever, and the necropsy showed hæmorrhagic stains in various parts of the body and nodules of connective-tissue new formation. Experiments were made in four cases, and in three out of the four the above-mentioned results were obtained; in the fourth case the authors attribute their negative results to the fact that the patient had improved considerably under treatment. The diplococci found by the authors differ considerably from any that are usually present in the oral cavity of man.

The investigations of Albertoni ³²¹_{Apr. 15, '96; May 25} into gastric digestion, putrefactive processes, nitrogenous metabolism, and the changes in the various elements of the blood in scorbutics show that in scurvy with a protracted course free hydrochloric acid is absent from the gastric juice, and that the total acidity is much reduced, but that this is not so in every case, nor yet at all stages in the disease. Peptonization is also feeble. There is no deficiency of chlorides in the body, and the chlorides in the urine are diminished. Much depends on the various degrees of alimentation. A scientific basis for the use of acid fruits (limes, lemons, etc.) and vegetables is thus furnished.

Jamieson, of Edinburgh, ³⁶_{Aug., '96} describes a case showing that the scorbutic habit does not immediately follow on this hygienic deficiency. An example of this is afforded by the case of a man, aged 49 years, who had throughout life had good health. When in India he suffered from Guinea worm. Till the date of his wife's death, three years since, he was well attended to, but after that occurred he had lived alone, done his own cooking, and in consequence had been careless as to his diet. Though he had had an egg at breakfast, he indulged in a "tea-dinner," subsisting on tinned meats, bacon, and bread, never on any occasion taking either fresh vegetables, fruit, or milk. Still, till two months previous to the report he did not complain. Then he noticed red spots come out on his legs and thighs, which persisted, though they had become less vivid. Then he experienced rheumatic pains in his back, hip-joint, knees, and in the feet just above the toes. He felt very weary, a troublesome cough came on, he was constantly sleepy, and felt short of breath on exertion. There were numerous punctate, dark, purplish-red, hæmorrhagic spots, seated at the hair-follicles, on the legs and thighs; a large, blackish, purple ecchymosis behind and to the side of the right knee, and another, though fading into yellow, in the loose tissue under the right eye. The

gums were spongy, in places almost fungating. The urine had never been bloody or smoky, nor had there been bleeding from the bowel. The heart and lungs were healthy. Cases of scurvy are recorded by Lafleur and Kinghorn, of Montreal ²⁸²_{Sept., '95}; and Wm. H. Pearse, of Plymouth. ²⁶_{Sept., '95}

John C. Wise, of the United States Navy, ²⁰²_{Sept. 10, '95} remarks that, while scorbutus has declined in importance as a disease incident to sea-life and to armies, it would seem that changing physiological and economical conditions may cause it to be dreaded on land as it has hitherto been on the sea. A most interesting feature in this connection is the close resemblance of this disease—as seen in the young—to rachitis, and there can be no doubt that many cases have been considered and treated erroneously. Not only can scorbutus become engrafted on a rachitic stock, but the causal agencies of these diseases are not remote, both arising from deprivation of those proximate principles and elements which are requisite to normal histogenesis. The main feature of this disease is hæmorrhage. Spoliation of the blood is carried to such an extent that hydræmia is established, involving effusions into most of the organic tissues, the favorite seat being subperiosteal; and it is these conditions, so essential to the scorbutic state, which have established the identity of the disease. Thus, while the usual seat of the hæmorrhage is beneath the periosteum, it has also been reported as occurring in the nose, intestine, urine, muscles, medulla of the bones, pleura, spleen, and gums. Scorbutus attacks infants, as a rule, before the end of the first year of life. There is no great loss as to flesh, but the pallor is extreme, marked by muddiness of the skin; later the little patient, hitherto mentally active, becomes apathetic or irritable; muscular activity ceases; the lower limbs become flexed, and efforts to extend them provoke piteous cries of pain. Swelling of the limbs, usually symmetrical, soon follows; at first undecided, it progresses to deformity; the favorite seats of this symptom are the wrists, the epiphyseal junctions of the ankles, and the thighs, the swelling at the ankles extending upon and involving the tibiæ to a greater or less extent. When the child is held in the lap, the limbs hang in a helpless fashion, with feet everted,—very suggestive of paralysis. Instead of sitting, the patient now reclines and no longer uses the lower limbs, though previously able to walk. There is intense irritability and pain of the affected parts, due, doubtless, to two causes,—pressure on the nerves and anæmia. In cases somewhat advanced a characteristic occurrence is hæmorrhage into the orbit; unless aware of the true nature of the disease, we are apt to believe we are dealing with a catarrhal condition; the lids swell, but there is

little discharge and no relief is afforded by treatment which is usually successful in catarrh. Some ecchymosis of the lids is noted and the eye looks protuberant,—which is in reality the case, it being displaced by hæmorrhage beneath the orbital periosteum. This displacement is an obstinate condition and exists, in a case under the writer's care, four months after disappearance of other symptoms.

If dentition is in progress it is delayed or the teeth are black and corrugated when they appear. The gums are extremely vascular and bleed easily; soon sponginess is marked and fleshy growths protrude about the erupting teeth; sometimes the teeth are covered in by the swollen gum as if by a hood. All of which is accompanied by a most fetid condition of the breath. The digestive symptoms are markedly in contrast with those of rachitis. The appetite is good,—an effort apparently to make up in quantity what is lacking in quality. Diarrhœa does not exist, as in rachitis, unless codliver-oil is being given, and even then it may be absent, the oil only serving, by its malassimilation and decomposition, to give a foul odor to the alvine discharges. The urine is diminished, has a strong odor, and is sometimes albuminous; hæmaturia, though noticed in some cases, is not a common symptom.

The temperature is elevated from one to two and one-half degrees, and has slight diurnal variations. A prominent symptom is sweating of the head, just as in rachitis. If after the lapse of a month or two the true nature of the case is not determined and appropriate treatment instituted, emaciation sets in and we detect the osseous swelling about the femur and tibia more distinctly. If, on the other hand, the disease is to give way to improved diet and treatment, the subsidence of swelling at once commences, progressing rapidly, the bony formations are absorbed, deformity disappears, and motion is slowly restored. Scorbutus in the young is found in the homes of the affluent oftener than in those of the indigent. This is due in greatest measure to the extensive use, among the better classes, of proprietary foods, which are beyond the reach of the poor.

Wise ²⁰²_{Sept., '96} states, in regard to the treatment of the affection, that in a case of scorbutus which has been treated as rachitis we should dispense with the chalybeate and the lime syrups—which, after all, are but adjuncts to a proper diet—and use pure cows' milk sparingly diluted with lime-water and scalded; baked potato, finely sieved; and last, but not least, allow orange-juice, not by the teaspoonful, but sweet oranges *ad libitum*. This simple treatment has obtained most satisfactory results in the author's hands. As

to codliver-oil, it may or may not be superadded; a good criterion will be to watch the bowels in reference to its assimilation; as a rule, it is unnecessary.

[Louis Starr, of Philadelphia, ⁵Dec., '95 reports three cases of infantile scurvy from sterilized milk.—F. P. H.]

Barlow's Disease.

W. Lunz ⁶²¹No. 8, '95 reports the first case of this affection observed in Russia. The disease, also called hæmorrhagic osteopathy, presents the following characteristics: A waxy whiteness of the skin, often with disseminated purple spots and suffusions; œdema of the articulations of the foot, as well as of the bridge of the nose and of the scalp; saturation of the muscular system with a sero-gelatinous substance. The most characteristic changes occur in the periosteum, which separates from the bone through a blood-coagulum resulting from transudation of blood; this condition is met with in the flat bones. The bone is not thickened, but the upper surface is somewhat rough. The marrow is hyperæmic and rich in lymph-cells and leucocytes. A rachitic tendency is usually the cause of the disease, which almost exclusively affects children.

Purpura Hæmorrhagica.

Four cases of this disease were reported during the year. A. Choschew ⁵³⁰Nos. 23, 24, '94; No. 1, '95 describes two cases, interesting through the fact that they presented many peculiarities. There was bleeding from the nose as well as from the ears in both cases. In one patient the disease developed upon a malarial basis; in the other case there was enlargement of the spleen and of all the lymphatic glands; so that leucocythæmia might have been suspected had not the condition of the blood proved the contrary.

Schiporowitsch ⁸⁵⁹Nos. 41, 42, '94 reports two very decisive cases from the Obuchow Hospital, one of which was characterized by a number of cutaneous hæmorrhages and ran a mild course. The other, in which the outward symptoms were comparatively less important, rapidly ended in death. The autopsy revealed unmistakable hyperplasia and pigmentation of the spleen and acute fatty degeneration of the heart, liver, and kidneys. This anatomo-pathological picture, no doubt, points to an infectious malady, although the author does not refer the hæmorrhages to an accumulation of bacteria in the blood-vessels, but rather to a thrombosis of the latter caused by the agglutination of lymphocytes through chemotaxis with the toxins circulating in the blood.

The Blood in General Diseases.

Monti¹⁵⁸_{B.18,H.3,4,'95} states that, in children, the specific gravity of the blood is raised in certain febrile diseases. It increases during the inflammatory stage of pneumonia and diminishes after the crisis; during the acute stage of intermittent fever it also increases, to fall slowly and gradually when the fever has ceased. It increases in pleurisy during the entire febrile period. In pulmonary tuberculosis the specific gravity is normal when there is no fever and the general condition is good; it diminishes, on the contrary, when this is not the case. It becomes lower in various forms of anæmia, nephritis, and chorea. The parallel between the specific gravity and the quantity of hæmoglobin is modified in cases of mild chlorosis, the former being normal, but the latter diminished. In diseases of long duration, as tuberculosis, giving rise to great organic combustion, the specific gravity increases while the hæmoglobin diminishes; in acute nephritis the specific gravity diminishes and the hæmoglobin remains nearly normal; while in severe chlorosis, leukæmia, and pernicious anæmia both specific gravity and hæmoglobin decrease, though there is no close relation between the respective changes.

Bianchi-Mariotti,¹¹³_{No.86,'94} from experiments as to the action of the soluble products of micro-organisms upon the general isotony and hæmoglobin of the blood, arrived at the following conclusions: 1. The soluble products of pathogenic micro-organisms (typhoid fever, anthrax, pyocyaneus, streptococcus pyogenes, cholera) have the peculiarity of regularly, though often only to a slight degree, increasing the isotonic contents of the blood. 2. The average quantities of filtered cultures may be numerically defined, and, according to the micro-organisms and the age of the cultures, amount to from three to six cubic centimetres per kilo of body-weight. 3. The typhus bacillus appears to form an exception; a rather considerable diminution of isotony was obtained after two injections, amounting in all to 7.5 cubic centimetres of filtered culture, made during a period of forty-two hours. 4. The injection of larger quantities than those mentioned always lessens the isotonic contents. 5. The quantity of hæmoglobin is always diminished after the injection of bacteriological products, the diminution appearing to be in direct relation to the amount injected. 6. Injections in repeated small doses, instead of the entire quantity at one time, show less influence upon the isotony as well as the hæmoglobin. This would imply, on the one hand, the habit acquired by animals of supporting inoculated toxins and, on the other hand, their elimination from the organism.

Livierato,³²⁶
II. 53, p. 303 in experiments on the variations in the amount of glycogen in the blood of healthy and diseased individuals, examined dry preparations of blood after the addition of a drop of iodine solution. In healthy blood he found that the glycogen reaction is usually slight. The glycogen is extra-cellular. Deviations due to absorption of food were not noticed. The intra-cellular glycogen reaction, which is regarded by the author as a sign of augmented glycogen, was most pronounced in croupous pneumonia, the more so as the process of pneumonia was extensive. A similar result, though less marked, was obtained in tuberculosis of the lungs. In typhoid fever the extra-cellular glycogen reaction was greater as the infection was more severe; in pulmonary complications intra-cellular reaction occurred. In acute exanthematous affections and in multiple suppuration the amount of extra-cellular glycogen was increased; in rheumatism of the joints, liver affections, heart diseases, and inflammations of the serous membranes the glycogen reaction failed or was indistinct. In a case of diabetes but little glycogen was found. Intra-cellular glycogen is met with during the nine months of pregnancy and during the first four or five days after parturition. The ingestion of syrup and peptone did not produce any noteworthy effect, but a subcutaneous injection of peptone caused a pronounced augmentation.

Alkalinity.—R. von Limbeck and L. Steindler³¹⁹
No. 27, '96 state that according to a number of authors there is diminished alkalinity of the blood in infectious fevers. They now demonstrate, however, by a great number of experiments, that these fevers, if ever, are certainly not always accompanied by diminished alkalinity of the blood or serum. Perhaps the relative oligoplasmia, which is a frequent symptom in infectious diseases, would suffice to explain a diminution of alkalinity of the blood, according to the methods of von Jaksch and Kraus.

Josef von Fodor⁵⁰
Feb. 28, '96; May 11 studied the influence of alkalinity of the blood on diseases produced by micro-organisms. Four series of experiments on animals demonstrated that, by the administration of alkalis (sodium bicarbonate by the mouth or by subcutaneous injection), the power of resistance against infection with cultures of anthrax bacilli is greatly increased. A large number of observations on the alkalinity of the blood in rabbits after infection with the bacilli of anthrax, cholera, typhoid fever, tuberculosis, and erysipelas showed that in the living organisms, after infection with certain bacilli, there is first an increase of alkalinity and then a diminution of the blood, more or less. If the infection is fatal, the diminution of the alkalinity is marked and progressive;

if not fatal, the diminution is slight and is followed by an increase of the same, in consequence of which the alkalinity of the blood becomes permanently higher than before the infection.

A. Gürber²⁰¹⁹₉₅ states that, upon saturation of the blood with carbonic acid, the alkalinity, as stated several years ago by Zuntz, is more than doubled. This alkalinity, however, is not, as supposed by the latter author, caused by a transition of the measurable alkali in the blood-corpuscles into serum, but results from the fact that under the influence of carbonic acid the serum becomes more concentrated upon the corpuscles in consequence of the giving off of water. The carbonic acid decomposes upon contact with a measurable alkali combined with albumin. Owing to the presence of the carbonic acid, carbonate of soda is produced from common salt, through which the free hydrochloric acid reaches the blood-corpuscles. This is the most important cause of the alkalinity.

The researches of Loewy having demonstrated that the method of estimating the alkalinity of the blood as formerly practiced gave too low a figure, it appeared necessary to verify by further experiments the discovery of Zuntz as to the diminution of alkalinity during the first moments after opening a vein. Such experiments were undertaken by the two authors²⁴⁶_{B. 68, p. 507} working together, the method formerly adopted by Zuntz being again resorted to in one instance, with the exception that upon measuring the two portions the acid was added at the same moment and both were vigorously shaken. Other experiments were afterward made in which measurement of red-colored blood was attempted. Both methods gave results agreeing with Zuntz's former statements. Experiments were made with blood the coagulation of which was prevented by the addition of peptone; here again there was a diminution of alkalinity, but not to the same extent as in the blood capable of coagulation.

F. Tausk¹¹³⁰_{B. 3, H. 3, 4, 95} describes a clinical method for determining the alkalinity of the blood, the methods employed up to the present time for ascertaining the alkalinity in a few drops of blood not having given entire satisfaction. He uses a small, specially constructed measuring glass, in which 10 cubic centimetres of a physiological solution of common salt are measured off, being destined in part for the thinning and in part for the preservation of the blood. The weight of the filled apparatus is noted, several drops of blood are added, and the weight again noted. The solution of salt containing the blood, previously colored a pale yellow with tropæolin, is titrated with 1-per-cent. normal sulphuric acid, which occasions a pronounced final reaction. According to this

method the author found the alkalinity of the blood in healthy persons to average 0.5 to 0.7 NaOH in 100 grammes. These figures are rather higher than those obtained by previous methods, but are probably to be regarded as more correct, since the main defect of former methods consisted in the fact that during the time required for examination the alkalinity had already diminished.

Carl Schultz-Schultzenstein ³⁶⁵_{Nov. 17, '94} ⁴⁵¹_{Feb., '95} presents a new clinical method of estimating the alkalinity of the blood. As distilled water is of an alkaline reaction it must be carefully neutralized before using. A $\frac{1}{10}$ normal solution of sulphuric acid and potassium hydrate is prepared of $\frac{1}{600}$ strength, or, in other words, $\frac{1}{600}$ of 49 grammes of sulphuric acid (0.0817 gramme) is dissolved in water and diluted to 1000 cubic centimetres. This is designated as a $\frac{N}{600}$ solution. The blood is drawn in the usual manner by sticking the cleansed tip of a finger, and a capillary tube such as is employed in the Fleischl hæmometer, and holding 0.0075 gramme, is used to suck up the blood, which is then blown out into a glass-stoppered flask graduated into cubic centimetres, and diluted to 12 cubic centimetres with the neutral water. To the diluted blood are then added 1.5 cubic centimetres of a $\frac{N}{600}$ sulphuric-acid solution, by means of which the fluid is rendered distinctly acid. After thorough mixing, an ethereal solution of erythrosin is added, and the whole is treated with a $\frac{N}{600}$ potassium-hydrate solution until the slightest rose tint appears; this is then caused to disappear by the careful addition of the $\frac{N}{600}$ sulphuric-acid solution. The difference between the amount of the $\frac{N}{600}$ alkaline and acid solution used gives the amount of $\frac{N}{600}$ sulphuric acid necessary to overcome the alkalinity of the blood.

C. Eykman, ²⁴⁶_{v. 60, p. 340, '95} referring to Bleibtreu's method for determining the volume of physical elements in the blood, objects to the latter, inasmuch as he considers that the 0.06-per-cent. solution of common salt which is mixed with the blood is hypoisotonic to the serum, and that, in consequence thereof, water enters into the blood-corpuscles, and the concentration of the saline serum solution is greater than it should be in accordance with the fundamental principle of the method, and that the volume of the corpuscles is therefore estimated at too low a figure. The author made experiments in which he determined the number of blood-corpuscles, once according to Bleibtreu's indications and once by the use of a rather more than 0.09-per-cent. solution of common salt, which is isotonic to the blood; in the latter case he obtained a greater volume than in the first.

S. G. Hedin ²⁴⁶_{v. 60, p. 360, '95} studied the conditions under which the centrifugal method may be used to determine the number of cor-

puscles and reached the following conclusions: Both Müller's solution and the 2.5-per-cent. bichromate solutions have an enlarging effect upon the blood-corpuscles, though the action of the latter is somewhat greater. The compression of the blood-corpuscles is slower in the case of the bichromate solution than with Müller's solution. With both these solutions, however, the result is slower than with the chloride-of-sodium solution. The saline solutions—which alter the volume of the blood-corpuscles—vary in their effect upon different individuals and the results can therefore not be compared one with the other. When it is desired to obtain the fluid exerting the greatest thinning effect, solutions of common salt should be preferred to those of the bichromate. Among the ordinary salt solutions that which is isotonic to the blood is the most suitable, as it does not in any way affect the volume of the blood-corpuscles; the latter is a solution of rather more than 0.9 per cent. In order to prevent coagulation 0.1 per cent. of oxalate of sodium is added. The blood-corpuscles are much more readily compressed by the use of short (thirty-five-millimetre) tubes than when the seventy-millimetre tubes are used. The author also describes an apparatus for determining the volume of the corpuscles for practical usage and gives explicit directions for the use of the same. Finally, he discusses the objections advanced against the use of the centrifuge, and, in particular, Bleibtreu's. He repudiates the latter (1) because Gärtner's hæmatokrit—the apparatus whose adaptability was tested by Bleibtreu—has several defective points which the author's apparatus does not present; and (2) because Bleibtreu's method of determining the volume of the corpuscles, through which the results of the hæmatokrit are controlled, is also defective, since, owing to the mixture with the 0.6-per-cent. solution of common salt, the volume of the corpuscles is increased through the absorption of water; besides this, substances containing nitrogen are supposed to go from the serum into the blood, with the effect that the harmony of the results, which should in itself control the method, is impaired. The author claims to have found that, upon mixing the blood with from two to three volumes of the 0.6 per-cent. solution of ordinary salt, almost all albuminous bodies disappear from the sero-saline mixture.

Bleibtreu, ²⁴⁶_{v.60,p.340,'95} replying to the two authors quoted on preceding page, recognizes the justice of Eykman's objections and reports experiments which confirm his statements. The 0.6-per-cent. solution of common salt was formerly recommended by him because, at the time of the development of the method, it was generally accepted as being isotonic, and because the verification of

Bleibtreu's method by that of Hoppe-Seyler called for the use of the 0.6-per-cent. solution in consequence of a defect in the latter. The author, on the contrary, disagrees with the statement of Hedin, that, upon the mixture of the blood and the common salt solution, nitrogenous substances migrate into the blood-corpuscles. He cannot confirm this statement of Hedin's, and, moreover, dwells upon the fact that, upon the mixture of the blood with a 0.98-per-cent. salt solution,—which, according to Hedin, causes the migration of the substances in question,—the volume of the blood-corpuscles must become changed, although Hedin himself states that isotonic solutions of common salt do not change the volume of the corpuscles. The author, therefore, considers his method as practicable with the use of a 0.9-per-cent. saline solution. With regard to the centrifugal method he states, in conclusion, that the examinations made up to the present time do not prove that, in the blood of several individuals of the same race (men or animals), the volume of sediment is in exact proportion to the true body-weight. The fact that, under pathological circumstances, variations in the size of the corpuscles may occur makes the value of the centrifugal method doubtful for practical purposes.

Technique.

W. Y. Cowl, of Cincinnati, ⁵⁹_{Aug. 17, '95} has reached the conclusion that examinations with reference to either the volume or weight of the corpuscles of the blood, as a whole, cannot be entirely exact at the present time. This hypothesis can be readily maintained by reason of the hitherto disregarded volume or weight of the fugitive corpuscles, usually denominated blood-plaques, which have been long since demonstrated by Norris to be present in large numbers in every specimen of normal blood, although disintegrating to a large extent soon after the latter is shed.

In a preliminary examination of the hæmatokrit method as hitherto employed, he found that a serious source of error lies, in point of fact, in the substance employed to prevent coagulation,—namely, potassium dichromate, either as contained in a simple 2½-per-cent. solution of salt or in Müller's fluid: potassium dichromate, 1; sodium sulphate, 2; aqua, 100.

Under microscopical examination of a number of specimens of corpuscles removed by centrifugal force from a mixture of blood with either of these solutions he noticed a granular organic sediment, at times in patches, inclosing a number of red discs. From this it is apparent that the bichromate solution may vitiate the result by a precipitation or coagulation of solid matter from the plasma,

thus increasing the apparent amount of corpuscles in the specimen subjected to examination.

Based upon the facts detailed with reference to the prevention of coagulation, on the one hand, and the prevention of the escape of hæmoglobin from the erythrocytes, as well as the prevention of their swelling, on the other, he made and tested the following solution for employment in the hæmatokrit method: It has yielded us results of exceptional uniformity, and, unlike the bichromate solution, produces no precipitation of albumin. Its formula is: sodii oxalate, 2; sodii chlorid., 10; aquæ dest., 1000. This solution, when mixed with blood and allowed to stand at rest, permits the corpuscles to sink with unusual rapidity, leaving a clear, almost colorless, supernatant fluid, composed substantially of diluted plasma, while the corpuscles themselves preserve their normal microscopical characters.

The chief improvement in the hæmatokrit method up to the present time has been made in the mechanical means of execution. Daland's employment of the Zeiss hæmatocytometer pipette for taking the specimen of blood increased the certainty of its exact measurement, while Gärtner reduced or removed the liability to error in the further process by directly transferring the whole of the specimen, mixed with a large and unmeasured quantity of the bichromate solution, to a tube for centrifugation, having a funnel-shaped reservoir for the same at the centripetal end. This tube, however, has been found in practice by Friedheim to leak at the centrifugal end, owing to an extraordinarily ill-devised combination of rubber cap fitted to a screw-thread cut or, rather, attempted to be cut directly on the glass tube.

To avoid this palpable source of error he has had constructed a new tube of simple kind, the chief characteristics of which are a closed centrifugal end, a wider bore, and a single graduation, indicating the total quantity of blood introduced. The closed end prevents all possible loss of corpuscles during the centrifugation, the wide bore permits a better extraction of surrounding fluid from the same when already tolerably compact and enables a better subsequent removal of the same, while the single graduation allows of the employment of a number of like tubes in connection with a finely-graduated scale fitted to receive them.

F. W. Arnold, U. S. N., ⁹_{Sept. 20, 190} considers Hedin's hæmatokrit as satisfactory, and has added to its advantages a modification for measuring the heights of the columns of corpuscles by direct reading, with low powers ($\times 200$ or less) of the microscope, from the limb graduated for recording the lateral motion of the mechanical stage, instead of the set graduations upon the tubes containing the

diluted blood. The method of taking the reading is shown in the microscope resting on a support upon the edges of its stage and of its foot, to prevent beveling of the tops of the columns of the corpuscles, which occurs in other positions, from gravitation. Of course, some forms of microscopical stands will not lie in this position, but very little ingenuity would obviate this difficulty.

Considering the sources of error introduced and the trouble involved in the process of transferring the diluted blood from the capillary tube, for measuring and mixing, to the tubes of the hæmatokrit, Arnold has also designed a frame capable of receiving and holding during rotation the tube for measuring and mixing

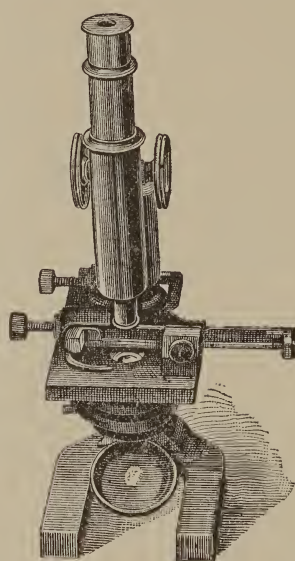


FIG. 1.—MODIFICATION OF HÆMATOKRIT. (ARNOLD.)
Medical News.

itself. This is shown *in situ* in Fig. 2, which is a reduced working drawing, complete even to the conventional hatchings for the representation of composition of rubber and of glass.

With this arrangement the blood is diluted, and, after thorough mixing in the bulb, the capillary portion of the tube is filled with the mixture to its tip and placed in the frame and secured upon the motor, or upon the train of gearing for rotating. The result of effective rotation will be that all of the fluid above the centre of form of the tube (its tip being considered as the lower end) will run into the bulb and that part of the tube above it, while the longest possible column of blood (for a given length of tube) of constant length and of absolutely exact dilution will be

separated into its particulate and fluid components. Then, either the graduations on the tube or the microscope and its mechanical stage (and the author prefers the latter as more nearly conforming to the best scientific methods of measuring with great accuracy) may be used to get the percentage volume.

Arnold Josephson, of Gothenburg ³⁷²_{No. 2, p. 32, '94} (report of Dr. Eklund, Stockholm, corresponding editor), makes use of the following simple method of staining blood-preparations, and finds that it is very convenient, as it requires only about five minutes' time: The air-dried preparation is passed rapidly through the flame of a spirit-lamp a few times, immersed in ether-alcohol, and again dried. It is immersed in a 2-per-cent. solution of eosin, washed off quickly in water, air-dried, immersed half a minute in a saturated solution of methylene-blue, washed off in water, dried, and placed in Canada balsam. The formation of the red corpuscles is somewhat altered by passing through the flame, but they absorb eosin as readily as before, the eosinophile cells especially taking on a beautiful color. It is best to examine the preparation immedi-

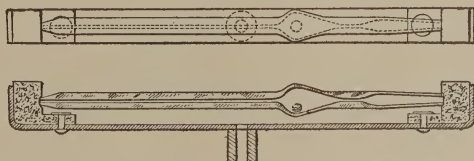


FIG. 2.—FRAME FOR HÆMATOKRIT. (ARNOLD.)
Medical News.

ately after it has been made, as the eosin-stain disappears very soon. The dry preparations can be preserved for a long time without diminution of the faculty for absorbing stains. The author has observed three cases of pernicious anæmia with two deaths, and was not able to find a single eosinophile cell in the blood in any of the cases, nor in the bone-marrow seven hours after death in one case. On the other hand, he has always met with them in anæmia not of a pernicious nature, as in tuberculosis, cancer, gastric ulcer, etc. In two cases of acute tumefaction of the spleen in ileotyphus and one of malarial tumefaction he did not observe an increase in the number of eosinophile cells, while there was a considerable augmentation in a case of tumor of the spleen following malaria. These examinations were made by the above method, and Josephson remarks that, practically as well as scientifically, it is of value as enabling a distinct differentiation to be made between anæmias of different nature or between leucocytosis and beginning leukæmia.

An improvement which facilitates the use of the Fleischl

hæmoglobinometer is contributed by B. C. Loveland, of Clifton Springs, N. Y. ^{June 1, 1905} The device consists of two semicircular pieces of paper or metal attached to the lower surface of the mixing-cup, with their straight edges at right angles to the septum in the cup, and leaving a straight strip of uncovered glass, an eighth of an inch wide only, in the bottom of the cup. The strip is cut in the centre by the septum of the cup so that the colored wedge passes under one end while the mixture of blood covers the other. Through these one may obtain a more accurate and a quicker estimate of the hæmoglobin, as the device cuts out all of the wedge except the portion opposite the figure on the scale from which the reading of the percentage is to be made.

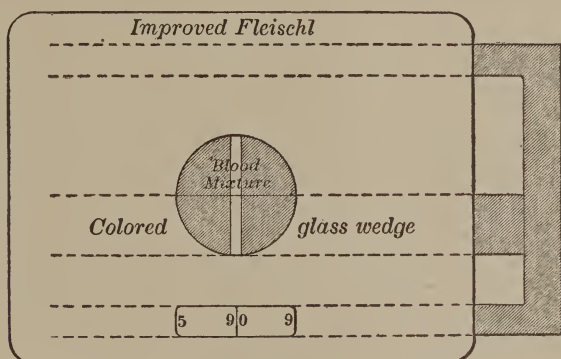
And, as the cup in the ordinary way places at once before the eye a portion of the wedge comprising 10 per cent. of variation in color for comparison with the blood in the other half, which is of an even color, the device described, it will easily be seen, very much simplifies the readings of the percentage, while at the same time it renders the reading much more accurate, as it eliminates the difficulty of estimating a medium shade of red when ten shades or degrees of the wedge are presented to the eye at once. And the eye will involuntarily set for comparison the blood side against the most prominent or dense portion of the wedge side. This same effect may be produced by having the portion of the glass bottom to the cup, which he has described as covered by the paper or metal, painted carefully over with some very dark paint. The cut on next page illustrates what has been described.

The reading will also be more accurate if the eyes are rested after the operator thinks he has matched the colors. If he will turn the cup around, thus looking at the wedge through the blood-mixture, leaving the other side a white surface, the strong contrast will rest the eye, when, by turning the cup to its ordinary position rather quickly, the operator will readily detect any slight fault in his matching the colors.

According to Stintzing and Gumprecht, ³²⁶_{B. 53, p. 265} the watery and dry constituents of the blood may easily be measured with sufficient exactness for clinical purposes by the following method: Five drops of blood are withdrawn from the finger by pricking the pulp, put on a cover-glass, weighed, dried for twenty-four hours at a heat of from 65° to 70° C. (149° to 158° F.), and weighed again. The total albumin in the blood may thus be estimated to within about 1 per cent. In man the dry substances average 21.6 per cent. and water 78.4 per cent.; in woman the dry substances 19.8 per cent. and the water 80.2 per cent. While this average is rarely exceeded, the dry substances may diminish

in anæmia to 8.5 per cent. In chlorosis they diminish more than do the number of corpuscles. In moderate cases of chlorosis the dry substance is notably more abundant than in anæmias in which there is the same amount of hæmoglobin, on account of the greater number of red corpuscles (stroma). There is a condition of true oligæmia, the composition of the blood, however, being normal. Leukæmic blood is characterized by a relatively large amount of dry substance and a diminution of hæmoglobin, and forms the most marked exception to the rule that all anæmia is a hydræmia, there being a diminution of hæmoglobin, an increase of other albuminoids, but not of water.

[The existence of such a rule is questionable. In typhoid fever, as I have shown, ¹¹²_{Sept. 15, '85} the blood is inspissated, while there is a decided reduction in the number of the red corpuscles. In



MODIFICATION OF THE FLEISCHL HÆMOGLOBINOMETER. (LOVELAND.)
New York Medical Journal.

stenosis of the œsophagus and in choleraic conditions also there is oligocythæmia associated with great increase in the density of the blood.—F. P. H.]

The blood in diabetes does not present any great alteration in this respect; disturbances in compensation and renal disease lead to an hydræmic condition of the blood, non-compensatory valvular lesions much more so than compensatory ones; when compensation is established the amount of water diminishes. The sanguine tissue takes part in the process and shows a serous plethora. The thickening action caused by loss of water and liquids may be hidden by the hydræmic effect of a general progressive disturbance in nutrition; this point is clearly evident after puncture of serous cavities.

Maxon ³²⁶_{B. 53, p. 399} finds that the amount of dry substances (albumin and hæmoglobin) in the blood diminishes or increases in such a

manner that the quantity of one may be deduced from that of the other. In diseases of the heart the amount of water is not increased, but is a little below the normal. It is only in anæmia and chlorosis that the albumin is lessened and the water increased, and here, too, there is a constant relation between the hæmoglobin and albumin. It is thus possible to estimate, by measuring the hæmoglobin, what diminution has taken place in the albuminoid substances of the blood in various diseases.

Mayet, of Lyons, ³¹_{Aug. 14, '95} discusses the importance of obtaining plasma in a pure state by separation of the corpuscles, either for analysis of the blood or for the preparation of serum for vaccination. He has, to this end, had made an apparatus worked by a mechanical motor, and permitting a rotation of twelve hundred turns per minute and even more. The test-tubes containing the blood are placed in metallic recipients which can be surrounded with a woolen covering in order to avoid reheating. Ice is placed around the test-tubes and the blood cooled to 0° C. (32° F.), thus preventing any alteration of the corpuscles and consequently of the plasma. The vessels holding the tubes are carried on pivots and naturally take an horizontal position during rotation, returning to the vertical as soon as the movement gradually ceases. Coagulation is avoided by the addition of 0.10 gramme (1½ grains) of potassium oxalate to 100 grammes (3½ ounces) of blood at the moment the latter is drawn, according to Arthus's method. By this means a pure and limpid plasma may be obtained, half the volume of the blood.

DISEASES OF THE SPLEEN.

General Considerations.

In an exhaustive contribution to the study of the spleen in infectious diseases F. Bezançon ²⁰⁰⁰_{'95} states that infection induces in the spleen two kinds of alteration. The first, structural changes, —less the effect of a direct lesion than of functional hyperactivity, —comprise hypertrophy of the Malpighian corpuscles, direct or indirect multiplication of lymphocytes or their transformation into mono- or poly-nuclear leucocytes and of phagocytosis, and proliferation of the elements of the pulp. In the second kind of alteration there are true lesions, especially of a degenerative nature, involving the corpuscle as well as the pulp and causing necrosis of cells or areas of cells. These lesions are preceded by the appearance in the pulp and blood-capillaries of large mono-nuclear or macrophagous leucocytes containing in their protoplasm products of cellular degeneration,—as, for instance, small leuco-

cytes, nuclear *débris*, hæmatins, and pigment. This condition may be seen in varying degrees in all local and general infections, bacteria being absent in the former and present in the latter, where they form colonies in the pulp, free or inclosed in phagocytes. From these lesions the rôle of the spleen in defending the organism against infection may easily be deduced. Though no precise points can be obtained by experimental pathology and the study of animals deprived of the spleen, the objective study of the human spleen at various stages of infections shows much more plainly its protective influence. The great predominance of phenomena of leucocytic proliferation over direct local phagocytosis shows that the organ in infectious diseases serves less to destroy the bacteria on the spot than to produce defensive elements to be carried to and utilized in the parts of the economy affected. The scant semeiology of the spleen—entirely limited to hypertrophy—makes it easy to understand why this evolution is obscure. This symptom, however, is of so much value that it frequently constitutes a decisive argument in favor of an infectious syndrome. H. S. Upson⁹_{v.66,p.14} suggests that, since the spleen does, without doubt, contain germicides, it probably, therefore, elaborates them. He, therefore, considers this organ as bactericidal.

Tumors.

Owing to the rarity of hydatid cysts of the spleen the clinician may often overlook them. Vivenza,⁵⁰⁵_{No.76,'96} who has had occasion to study the peculiar characteristics of one case, states that, when puncture is impossible, the diagnosis may be aided by the absence of anything that would account for splenomegaly, by the slow development of a tumor in the left loin, smooth, regular, conical, with the base above, and almost immobile during respiration. There is never any ascites and the general health remains good, although there may be febrile attacks of an infectious type. K. Renggli²⁰⁸⁴_{'94} discusses at length the subject of multiple cysts of the spleen. A patient, profoundly cachectic and suffering from melancholia, was picked up on the street and taken to a hospital in Naples, and Piccinino, who examined her,¹⁴_{July 14,'96} found, besides the mental condition, a marked increase in the size of the liver and an enormous enlargement of the spleen, albumin in the urine, and a dysenteriform gastro-enteritis. The diagnosis, although rendered difficult by the fact that the patient did not reply to questions, was apparently evident enough; the woman came from a part of the country where malaria was endemic and suffered from splenomegaly associated with amyloid degeneration of the liver, kidneys, intestine,—all of malarial origin. Great was the surprise of the

physician, however, on puncturing the liver, to find a liquid issuing from the puncture. The diagnosis was, therefore, modified before the evidence of hydatid cyst. The patient died and at the autopsy five large hydatid cysts were found in the liver. As to the spleen, although really hypertrophied and presenting, under the microscope, the lesions of malarial degeneration, it was far from being of the size presumed in the examination; it covered, instead, an enormous tumor, weighing 2 kilogrammes ($4\frac{2}{5}$ pounds), adherent to the vertebral column, surrounding the kidney and descending to the crest of the ilium. Histological examination showed it to be an endothelial sarcoma. Malaria, dysentery, hydatid cysts, malign tumor, nephritis, and melancholia—all separate affections—had simulated simple disease and one apparently easy of diagnosis. A case of lymphosarcoma of the spleen is recorded by G. N. Acker, of Washington ⁵¹ Aug., '95; and a case of angioma cavernosum, by M. D. Hoge, Jr., of Richmond, ⁵⁹ Sept. 21, '95 is interesting on account of the great rarity of this form of tumor invading the spleen and the perfect recovery after its removal.

Floating Spleen.—Proben ²⁷ May, '95 describes a case of floating spleen in an infant who was admitted, when a couple of weeks old, to a foundling asylum, but failed to thrive with two different wet-nurses, being puny, cross, and irritable. From physical examination and examination of the blood on different occasions, a diagnosis of floating spleen was made, and 6 grains (0.39 gramme) of quinine sulphate were given three times daily, alternating with medium-sized doses of arsenic. The child bore the treatment well and improved in weight and appearance, and the spleen diminished in size, but remained apparently floating about in the abdomen. A case of supposed rupture following severe bodily exertion was reported by Steudel. ³⁴ Jan. 29, '95

The Splenic Murmur.—Fedeli, ⁵⁸⁹ Nov. 11, 12, '95 from an attentive study of cases in his own experience, believes that he can explain more clearly than has been done before the mechanism of the splenic murmur. According to him, this murmur, which varies greatly in intensity, is analogous in its physical characteristics to the uterine, cephalic, and thyroid murmurs. Clinical experience, on the one hand, and experiments on the dog, on the other, have enabled him to ascertain that neither compression nor traction of the splenic artery will produce the murmur; but everything seems to show that it is due to modifications in the pressure, rapidity, and tension of the arterial blood under the influence of local causes,—as direct compression by a tumor, or general, such as the administration of the sulphate of quinine (Mosler), or an attack of fever (Griesinger). The author believes that the murmur may be of

some value in diagnosis, its presence indicating progressively increasing work on the part of the blood, and its arrest the passing of the spleen from the state of congestion into a state of sclerosis.

Enlargement.

Important in connection with the clinical aspect of these cases is the fact that supernumerary spleens may exist and thus form by their presence increased volume. Albrecht⁸⁴ ^{May 2, '95} ⁶ ^{May 25} exhibited, at a meeting of the Vienna Medical Society, an anatomical preparation which contained a very great number of spleens. Cases of supernumerary spleens are not rare, but in this instance the number was extraordinary. In the usual situation there was a spleen the size of a walnut, with the splenic artery and vein in their normal position. The other spleens were dispersed not only on the mesogastrium, but also on the peritoneum, as, for example, on the hepatic ligament and on the convexity of the liver; the largest number were found on the mesentery and transverse mesocolon; there were more than thirty in Douglas's pouch. All these formations were characterized by red color and pulp, and that they were composed of spleen-tissue was proved by microscopical examination.

But seventeen cases of primary enlargement have so far been recorded, and only three of these were in women. In a case observed by Naguel, of Moscow,³¹ ^{Jan. 10, '95} the patient was a peasant-girl of 16 years, who entered hospital on account of general weakness and increase in the size of the abdomen. There was no history of scrofula, syphilis, nor malaria. Diarrhœa, which had been frequent since childhood, had been especially marked for two months, but there was no gastric trouble. The abdomen had always been large, and for the past two years the girl had been conscious of a firm body in the right side. Œdema of the limbs had developed within a month and the abdomen had greatly increased. Examination showed paleness of the skin, slight generalized œdema, and some ascites, with hypertrophy of the glands. Palpation, which was not painful, showed that the spleen, firm and smooth, occupied the left half of the abdomen and reached to the umbilicus. Examination of the blood revealed 2,500,000 hæmatins, 30 to 33 per cent. of hæmoglobin, and 1 white for 350 red corpuscles. Nothing abnormal could be noted in the viscera. Treatment with Bland's pills was without effect. John H. Carslaw, of Glasgow,²¹³ ^{Apr., '95} observed a case of remarkable enlargement of the spleen in a boy of 18, the subject of inherited syphilis, and cases are also described by D. W. Barstow, of New York,⁵⁹ ^{Aug. 3, '95} and William Collier, of London.² ^{Jan. 19, '95}

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